Clear-Com®
COMMUNICATION SYSTEMS

ECLIPSE OMEGA MATRIX

FRAME AND CIRCUIT CARDS

INSTRUCTION MANUAL

Eclipse Omega Matrix Instruction Manual
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IMPORTANT SAFETY INSTRUCTIONS

Please read and follow these instructions before operating an Eclipse Omega matrix system. Keep these instructions for future reference.

Please read and follow these instructions before operating an Eclipse Omega matrix system.

(1) **WARNING**: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

(2) Do not use the apparatus near water.

(3) Clean only with a dry cloth.

(4) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions. Install the Eclipse Omega matrix system according to the directions in the Installation Chapter of this manual.

(5) Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat. Do not place naked flame sources such as candles on or near the matrix.

(6) Do not defeat the safety purpose of the polarized plug or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

(7) Protect power leads from being walked on or pinched particularly at plugs, at convenience receptacles, and at the point where they exit from the apparatus.

Note: A "convenience receptacle" is an extra AC power outlet located on the back of a piece of equipment, intended to allow you to power other equipment.

(8) Only use attachments/accessories specified by the manufacturer.

(9) Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

(10) Unplug the apparatus during lightning storms or when unused for long periods of time.

(11) Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as a power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Please familiarize yourself with the safety symbols in Figure 1. When you see these symbols on an Eclipse Omega matrix system, they warn you of the potential danger of electric shock if the system is used improperly. They also refer you to important operating and maintenance instructions in the manual.

This symbol alerts you to the presence of uninsulated dangerous voltage within the product's enclosure that might be of sufficient magnitude to constitute a risk of electric shock. Do not open the product's case.

This symbol informs you that important operating and maintenance instructions are included in the literature accompanying this product.

Figure 1: Safety Symbols

EMC AND SAFETY

The Eclipse Omega matrix meets all relevant CE, FCC, UL, and CSA specifications set out below:

EN55103-1 Electromagnetic compatibility. Product family standard for audio, video, audio-visual, and entertainment lighting control apparatus for professional use. Part 1: Emissions.

EN55103-2 Electromagnetic compatibility. Product family standard for audio, video, audio-visual, and entertainment lighting control apparatus for professional use. Part 2: Immunity.

UL 60065-7, CAN/CSA-C22.2 No.60065-3, IEC 60065-7 Safety requirements.

And thereby compliance with the requirement of Electromagnetic Compatibility Directive 2004/108/EC and Low Voltage Directive 2006/95/EC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

THE ECLIPSE OMEGA MATRIX SYSTEM: AN OVERVIEW

The Eclipse range of matrices comes in three frame formats. The Eclipse Omega matrix is the largest with 15 client card slots providing up to 240 ports in six rack units (6RU). The other members of the Eclipse family are the Median, with slots for up to 7 client cards and 8 interface modules in six rack units (6RU), and the PiCo, with up to 36 panel and 4-wire ports in one rack unit (1RU).

Clear-Com designed the Eclipse Omega matrix with modular components that help you to plan, build, or customize your communication system to meet the most rigorous demands of modern broadcast, performing arts, industrial, aerospace, and military environments.

The Eclipse Omega matrix houses up to 240 ports and dual redundant power supplies in a six rack unit chassis.

FEATURES

Features of the Eclipse Omega matrix system include:

- Full audio bandwidth throughout the signal chain, producing superior broadcast audio quality. The system maintains 24-bit sampling and 30 Hz to 22 kHz frequency response.
- A six rack-unit matrix housing up to 240 RJ-45 ports and dual redundant power supplies.
- Fifteen available port cards supporting 16 ports each.
- Fail-safe redundancy achieved by two processor cards and two power supplies.
- Power supplies that automatically switch to the correct voltage, for compatibility around the world.
- Eight general purpose inputs and eight relays, located directly on the matrix.
- Full compatibility with selected Matrix Plus 3 panels and interfaces, selected 4000 Series II panels, V-Series panels and FreeSpeak/CellCom antennas and splitters.
- Matrices that link across cities, nations, or continents through trunk lines and fiber.
- Uses the same fiber-networking cards as the Eclipse Median matrix.
- Connection to FreeSpeak/CellCom antennas and splitters using the E-Que card.
- Multiple E-Que cards can be fitted to a single matrix.
- VOX-programmable audio which visually cues you at the matrix when audio transmits at a programmed threshold on a connected intercom panel or interface.

- "Virtual" operation in which a complete networked system can be operated and maintained from anywhere in the world. The system provides both local area network and Internet access to the central matrix.
- Visual and intuitive Eclipse Configuration System (ECS) programming software.

THE ECLIPSE OMEGA MATRIX

A complete Eclipse Omega system consists of a central matrix and the remote audio devices—intercom panels, interfaces, 4-wire equipment—connected to it. Each element of the Eclipse Omega system is briefly described in this chapter and more fully described later in this manual and in the Eclipse set of manuals.

The Eclipse set of manuals includes individual manuals on each matrix, panel, and interface in the system, as well as *Installing the Eclipse System: An Overview.*

MATRIX ASSEMBLY

As shown in Figure 1, the matrix assembly consists of the following components:

- The metal housing for the circuit cards and power supplies, called the "matrix"
- The removable and replaceable circuit cards
- The removable and replaceable power supplies
- The rear panel connectors which link the circuit cards to devices and media such as intercom panels, interfaces, wireless equipment and optical fiber.

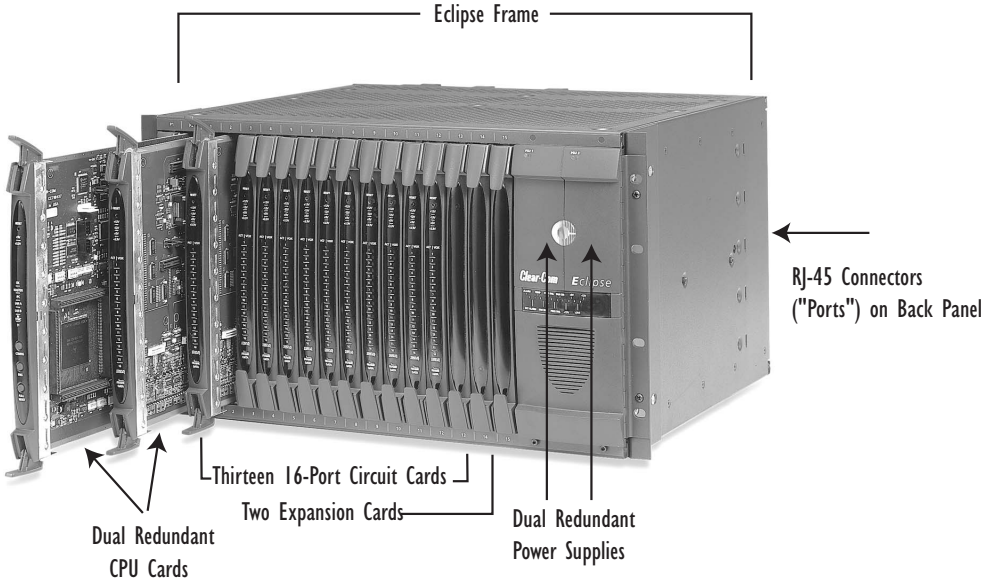


Figure 1-1: The Eclipse Omega Matrix Assembly

Note: The term "central matrix" is used to differentiate the system's core hardware and software from the connected intercom panels and interfaces. The central matrix itself consists of the matrix hardware and the ECS software.

MATRIX CHASSIS

The matrix chassis is a metal rectangular box which measures six rack units high and 19-inches wide (26.9 cm x 48.3 cm). It has slots for 17 circuit cards and 2 power supplies.

RJ-45 and fiber-optic connectors are located on removable plates on the rear of the chassis. These connect the circuit cards to intercom devices and media such as panels, interfaces, 4-wire audio equipment, wireless equipment and fiber-optic cables.

CIRCUIT CARDS

The matrix holds two types of circuit cards: system cards and port cards. The cards slide vertically into the front of the matrix and connect to the matrix's backplane.

CPU Card

The CPU card is the master configuration card in the Eclipse Omega system. It provides the serial data and Ethernet connection to the connected PC computer. The CPU card also coordinates the data flow between the other cards in the system, allowing them to communicate with each other. The computer memory chip which stores four complete system configurations is located on the CPU card, so that a selected configuration can be retrieved and activated directly from the card.

Like the other cards in the system, the CPU card fits in the Eclipse Omega matrix. The card fits vertically in a six rack unit (6 RU) space and connects to the matrix's backplane.

One CPU card is required for each Eclipse Omega system. Two cards can be installed to provide redundancy in the case of outages or repair needs.

Port Card

A port card controls the operation of panels and interfaces connected to it. Panels and interfaces connect to the port card through an RJ-45 connector, or "port," on the matrix's rear panel. Shielded category-5 cable attaches the panel or interface to the RJ-45 connector.

The MVX-A16 analog port card sends balanced audio and RS-422 data signals to connected audio equipment through 4-pair shielded category-5 cable. The card connects up to 16 audio devices—such as intercom panels, interfaces, or 4-wire audio equipment—to the central matrix. Each audio device connected to a port card communicates with all other audio devices in the system and with the central matrix.

For intelligent linking, shielded category-5 cable is run from a port on one Eclipse Omega matrix to a port on a second Eclipse Omega matrix to form a trunkline connection.

Fiber Card

Fiber cards connect Eclipse matrices together to provide a high speed, dual redundant link to transfer audio samples and data between systems. These connections can be configured in various ways to provide protection against the loss of a link or a node.

Each fiber card link consists of a front card with various status indicators and a rear card with two Duplex LC Terminated fiber optic connectors (TXVRA and TXVRB).

E-Que Card

The E-QUE cards allows the Eclipse matrix to connect to FreeSpeak/CellCom antennas and FreeSpeak/CellCom antenna splitters. Each E-Que card set consists of a front card with a reset button and various status indicators, and a rear card with eleven RJ45 ports giving eight standard ports, DECT sync in and out and a LAN port for diagnostic use.

Each E-Que front card has status LEDs for power, port activity and LAN status. The port activity LEDs indicate whether there is a device connected to an E1 port and that a connection has been established between this port and the connected device.

The E-Que cards must be fitted in the rightmost available slots (furthest away from the CPU cards) on the Omega and up to four E-Que cards can be fitted on a matrix.

POWER SUPPLIES

Eclipse Omega matrix has two Euro Cassette power supply units that you can easily install or remove as needed. One power supply unit can power an entire matrix; the second unit provides a backup in case of failure or damage to the first unit.

In addition, the two supplies have separate IEC connectors to AC mains, and are designed for completely automatic and transparent changeover between supplies in the event of a power outage in one of the AC mains circuits.

An over-temperature sensor is connected to both an audible failure alarm and a warning light, allowing you to diagnose and correct any power anomalies while the system remains operational.

MVX REAR-PANEL CONNECTORS ("PORTS")

The matrix's rear-panel RJ-45 connectors are called "ports." You connect shielded category-5 cable to a "port" to carry signals from the Eclipse Omega circuit cards to connected intercom panels or interfaces.

ECLIPSE CONFIGURATION SYSTEM (ECS)

The Eclipse Configuration System (ECS) controls the operation of the remotely connected audio devices by sending signals to the circuit cards in the matrix, which then relay the signals to the audio devices.

"Configurations"—which are the operating parameters of complete system setups, can be created from the connected computer. You can store four complete system configurations in the computer's memory to retrieve and activate when needed.

The Eclipse Configuration System runs on three versions of Windows: Windows XP, Windows Server 2003 and Windows 2000. When running ECS on the three Windows operating systems, the client and server can run on separate machines connected over a network.

From the Eclipse Configuration Software, you can create point-to-point and fixed group or party-line communications among the connected audio devices, assign a "label" to each port/panel, and inhibit or enable features at any connected panel. You can set up the system to run on a client/server model over a network, allowing you to control the matrix remotely.

INTERCOM PANELS AND ACCESSORY PANELS

All intercom panels connect to the central matrix via shielded category-5 cable terminated with RJ-45 connectors. The shielded category-5 cable connects to the matrix through the MVX-A16 analog circuit card. The following Clear-Com intercom panels are compatible with the Eclipse Omega matrix system:

- i-Station family, including expansion panels
- ICS-2003 intercom panels, including expansion panels
- ICS-52 and ICS-92 intercom panels, including expansion panels
- ICS-62 and ICS-102 intercom panels, including expansion panels
- ICS-1008 and ICS-1016 intercom panels, including expansion panels
- 4215E, 4224E, 4226E, 4294E, 4212E, 4222E, 4203E, 4206E, 4230E and 4230VE 4000 Series II panels
- V12LD, V24LD, V12PD, V24PD, V12LDD, V12LDE and V12PDE V-Series panels

Each of these panels is described in its own manual. For a full description of the operation, installation, and maintenance of a panel, refer to the appropriate panel instruction manual.

INTERFACES

Interface modules convert the 4-wire signals of a central matrix port to other types of signals that communicate with devices such as telephones, camera intercoms, two-way radios, and so on. In this way non-4-wire devices can communicate with the central matrix.

Each interface module has hardware connectors to connect to both the central matrix and to the external device that communicates with the central matrix. Most interface modules connect to the central matrix via shielded category-5 cable terminated with RJ-45 connectors. The DIG-2 digital interface module, however, connects to the central matrix via double-shielded 24 AWG conductor category-6 enhanced (CAT-6E) STP cable.

The type of cable used to connect the interface module to the non-4-wire device varies with the device. Each of these connections is described more fully in the individual manual for each interface.

The following interface modules are compatible with the Eclipse Omega matrix:

- TEL-14 telephone interface module
- CCI-22 dual party-line interface module
- FOR-22 four-wire interface module
- GPI-6 general purpose inputs interface module
- RLY-6 relay (general-purpose outputs) interface module
- AES-6 digital interface module
- DIG-2 digital interface module (transparent to the system, configured in ECS as the type of panel it is connected to)

Each of these interfaces is described in its own manual. For a full description of the operation, installation, and maintenance of an interface, refer to the individual manual for that interface.

2 OPERATION

THE ECLIPSE OMEGA MATRIX AND CIRCUIT CARDS

The Eclipse Omega matrix chassis houses the circuit cards, power supplies, and connectors that form the central hardware of the system. Measuring 19-inches wide and 6 rack units high (48.3 cm x 26.9 cm), the matrix chassis installs in a standard equipment rack.

Various types of Eclipse Omega circuit cards perform unique functions. System cards control overall system operation, port cards control the operation of connected panels and interfaces and communications cards allow communication with wireless equipment and fiber optic links.

Two Euro Cassette power supplies provide fail-safe redundancy in the event of a component failure or an AC circuit outage. Front-panel lights give you information about the condition of the power supplies, allowing you to take preventative corrective action.

Each MVX circuit card connects to an individual panel on the back of the Eclipse Omega matrix. This panel holds the RJ-45 sockets for connecting cable to intercom panels and interfaces.

The Eclipse Omega matrix is completely modular, allowing you to add or remove cards, power supplies, and connector panels to meet the operational needs of your environment.

FRONT-PANEL CONTROLS AND LIGHTS

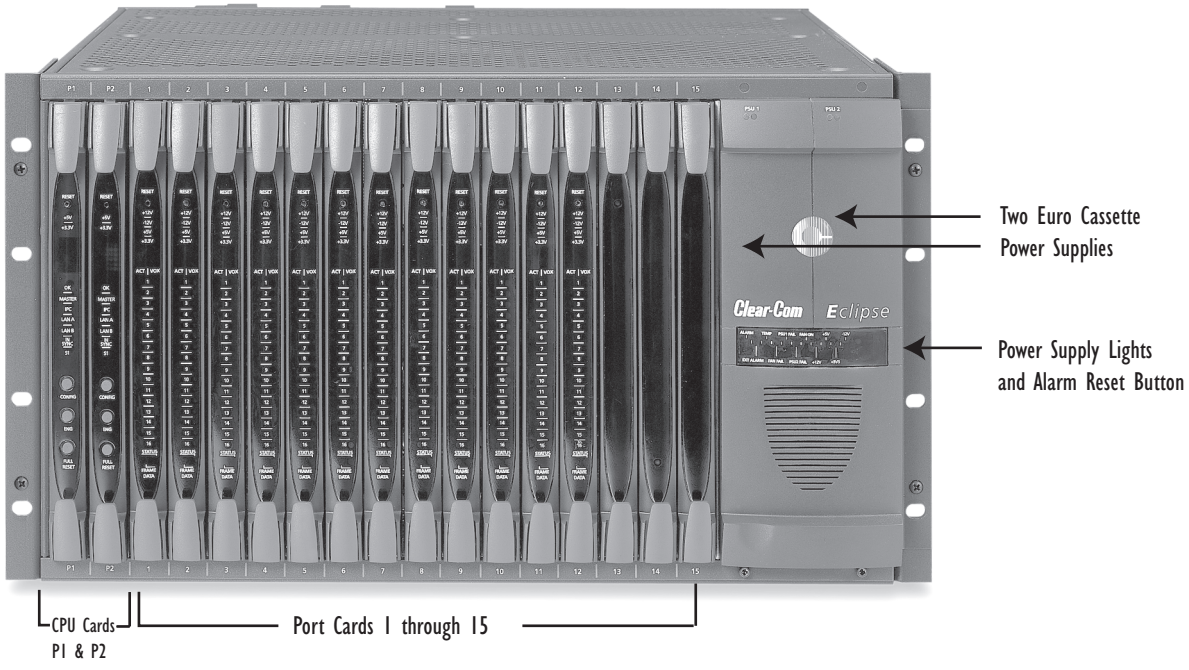


Figure 2-1: Front Panel of Eclipse Omega Matrix

CENTRAL PROCESSOR UNIT (CPU) CARD DESCRIPTION

The central processor unit (CPU) card holds the circuitry that allows the system to connect to, and communicate with, the following interfaces:

- A computer
- External alarms
- Eight general-purpose inputs (GPIs)
- Eight general-purpose outputs (GPOs)
- Two separate local area network (LAN) connections for Ethernet-based communication with a network
- An external interface that provides additional GPIs and GPOs

Note: General Purpose Outputs are also referred to as "relays."

In addition, the card's operational memory holds four complete preassigned system configurations to access and activate either directly from the CPU card or from the ECS configuration software.

CREATING AND STORING SYSTEM CONFIGURATIONS

A "configuration" is a complete set of operating parameters for the system which includes talk and listen paths for each connected intercom panel. Depending on the interfaces installed, the configuration can also include more sophisticated features such as paging, call signaling, interrupt foldback (IFB), ISO, groups, automatic DTMF dialing, routing, and many other features.

When you connect an external computer to the matrix, you can retrieve the current configuration information stored in the CPU microprocessor's memory (using the Eclipse Configuration Software) and display the configuration on the computer's screen.

Note: If the configuration does not remain in memory after you power off, please see the first section in Chapter 3, "Reconnecting the CPU Card's Backup Battery."

You can then apply the current configuration, modify it, or create a new configuration with the Eclipse Configuration Software. If you create more than one configuration, you can store unused configurations on your computer's hard disk or on CD-ROM to use later, allowing you to instantly reconfigure your system as often as you require.

The CPU card itself will store up to four complete configurations in its operational memory that you can apply either directly from the CPU card or from the connected computer.

SETTING THE DEFAULT IP ADDRESS

The CPU card LAN ports can be reset to their default IP addresses by pressing and holding the 'ENG' and 'FULL RESET' buttons on the CPU front card and then pressing the 'RESET' button at the top and then holding the 'ENG' and 'FULL RESET' buttons until the card resets. This will reset the LAN1 ethernet port to the factory default address of 172.16.2.100 and all other ethernet ports to the 0.0.0.0 (blank) address.

FAIL-SAFE OPERATION

The CPU card's non-volatile memory stores all information about the current operating configuration and the three additional configurations, allowing the system to restore itself automatically after a power failure, after replacement of a port card, or after replacement of a panel.

An Eclipse Omega system will operate with either one or two CPU cards. When you install a second card, that card stores the four configurations in its RAM as a backup to the main card. If the main card is removed or becomes non-operational for any reason, the system will automatically switch to the second card as backup.

CPU CARD LIGHTS AND CONTROLS

The following sections describe the CPU card's status lights and controls, which are illustrated in Figure 2-2.

① Reset Button

Pressing the reset button causes the CPU card to stop its current activity and to restart. The same configuration that was active before you reset the system will be active after you reset it.

During the reset, configuration information reloads to the card's operational memory from its non-volatile memory and the card starts running again from the beginning.

Note: The reset button is slightly recessed from the front panel to prevent it from being accidentally pressed. You need a tool, such as a bent paper clip, to press this button.

② Power Supply Lights

+ 5-Volt Light

When lit, the "+5V" light indicates that the matrix's +5-volt power supply is actively supplying power to the CPU card.

+3.3-Volt Light

When lit, the "+3.3V" light indicates that the matrix's +3.3-volt power supply is actively supplying power to the CPU card.

③ Dot Matrix Lights

The rectangular array of lights just below the power-supply lights displays a number (either 1, 2, 3, or 4) to indicate the currently selected configuration. The Eclipse Configuration System (ECS) controls these lights.

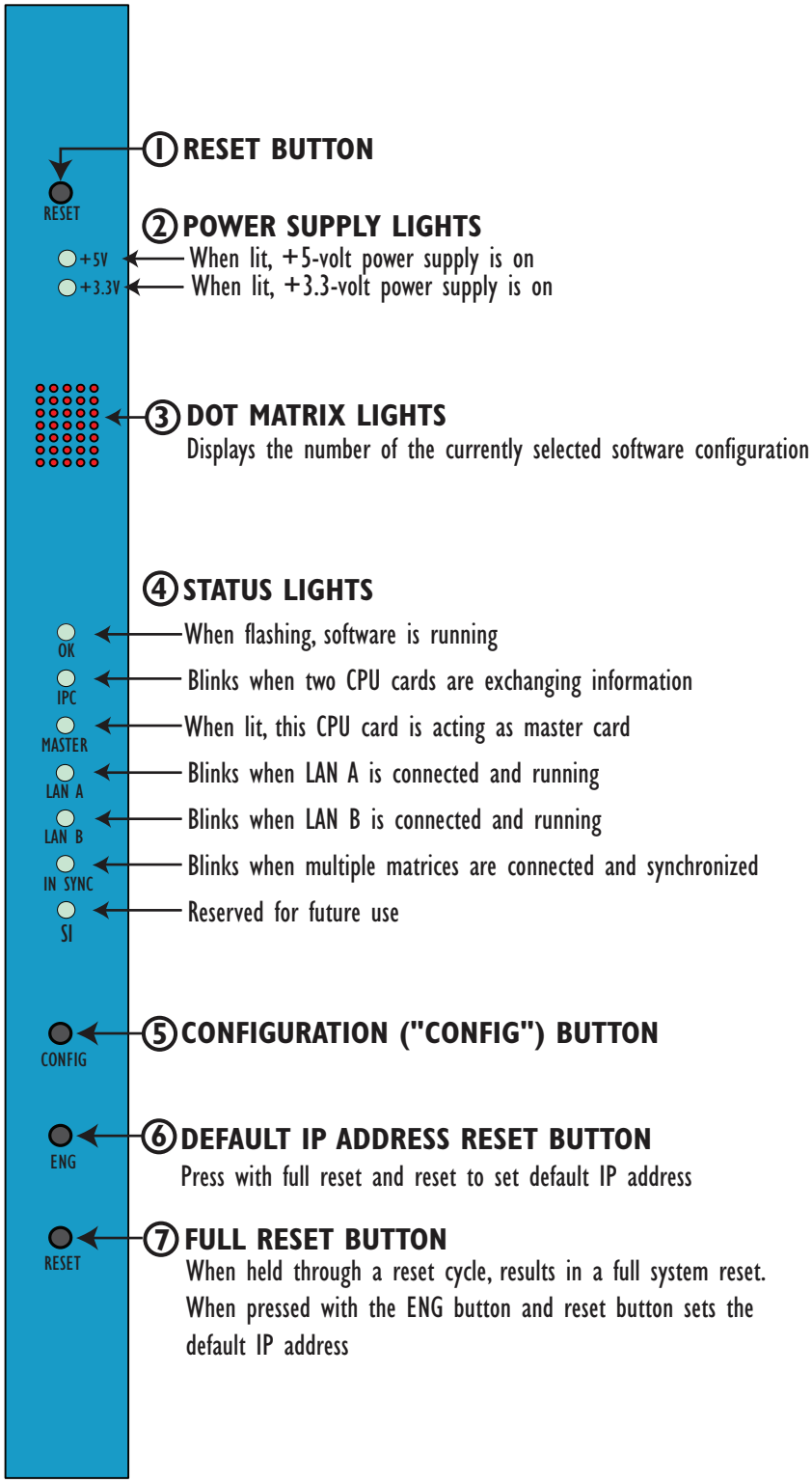

RESET
+5V
+3.3V
OK
IPC
MASTER
LAN A
LAN B
IN SYNC
SI
CONFIG
ENG
RESET
1 RESET BUTTON
2 POWER SUPPLY LIGHTS
When lit, +5-volt power supply is on
When lit, +3.3-volt power supply is on
3 DOT MATRIX LIGHTS
Displays the number of the currently selected software configuration
4 STATUS LIGHTS
When flashing, software is running
Blinks when two CPU cards are exchanging information
When lit, this CPU card is acting as master card
Blinks when LAN A is connected and running
Blinks when LAN B is connected and running
Blinks when multiple matrices are connected and synchronized
Reserved for future use
5 CONFIGURATION ("CONFIG") BUTTON
6 DEFAULT IP ADDRESS RESET BUTTON
Press with full reset and reset to set default IP address
7 FULL RESET BUTTON
When held through a reset cycle, results in a full system reset.
When pressed with the ENG button and reset button sets the
default IP address

Figure 2-2: CPU Card's Front Panel Lights and Controls

④ Status Lights

OK Light

When flashing, the "OK" light indicates that the CPU card is successfully communicating with the Eclipse Configuration System (ECS).

IPC (Interprocessor Communication) Light

The "interprocessor communication" (IPC) light only operates when there are two CPU cards in the matrix. When lit, the light indicates that the two CPU cards are exchanging information.

Master Light

An Eclipse Omega system can have two CPU cards, although the system will operate with only one. If the primary card becomes unavailable for any reason, the second card can serve as backup while the primary card is repaired or replaced.

The "master" light illuminates on whichever CPU card is currently serving as master. If there is a backup CPU card in the matrix, its "master" light will not illuminate if the primary card is acting as master.

LAN A Light

When you connect a local area network (LAN) to the matrix's "LAN A" port, the CPU card's "LAN A" LED lights to indicate a connection to the Eclipse Configuration System LAN A.

LAN B Light

When you connect a second local area network to the matrix's "LAN B" port, the CPU card's "LAN B" LED lights to indicate a connection to the Eclipse Configuration System (ECS) LAN B.

Sync Light

When you connect multiple Eclipse matrices together, the "sync" light illuminates to indicate that the matrices are connected and synchronized.

SI Light

The "SI" light flashes to indicate communications activity.

⑤ Configuration "CONFIG" Button

The CPU card can hold four complete system configurations in its operational memory. When you tap the "CONFIG" button, the number of the currently active configuration (either 1, 2, 3, or 4) appears in the dot-matrix display.

Each time you subsequently tap the button, the next configuration number in the series appears in the dot-matrix display. The numbers cycle forward until all of the choices have been displayed, then start again at "1."

When a non-active configuration's number appears in the display, it flashes to indicate its non-active status. When an active configuration's number (either 1,2, 3, or 4) appears in the display, it illuminates solidly (without flashing) to indicate that it is the active configuration.

To select one of the four configurations from the CPU card:

1. Repeatedly press the CONFIG button until the desired configuration's number (1,2,3, or 4) appears in the display.
2. When the desired number appears, press and hold the CONFIG button until the display stops flashing. This should take about three seconds.

   The selected configuration then becomes the system's active operational configuration.

⑥ Engineering "ENG" Button

This button is used to reset the system to the default IP addresses.

⑦ Full Reset Button

When you perform a full reset, all cards in the matrix reset regardless of any system preferences in the program software and non-volatile memory is cleared.

To perform a full reset:

1. Press and hold the card's lower RESET button (the "full reset" button).
2. Simultaneously press and release the card's upper RESET button.
3. Continue holding the card's lower RESET button for two seconds.

   The card performs a full reset.

The same configuration that was active before you reset the system will be active after you reset it.

When the cards and connected audio devices reset, they momentarily stop their current activity and restart. During this process configuration information is downloaded to the cards and audio devices from the CPU card's non-volatile RAM.

Note: Under normal operating conditions it is not necessary to perform a full reset. Technical personnel might perform a full reset if they believe that the CPU card is operating incorrectly as a result of corruption of the microprocessor's internal data or instruction sequence.

PORT CARD DESCRIPTION

Port cards connect the central matrix to intercom panels and interfaces. In a linked system, port cards connect trunk lines. The analog card, designated the "MVX-A16," supports normal audio feeds, user panels, and trunk lines.

All cards contain a voice detection mechanism ("VOX") that you program from the ECS configuration software. VOX detection allows you to know when the audio on a particular channel has exceeded a threshold. This is particularly useful for channels that are inactive periodically, so that you are visually cued when audio appears on the line.

Each port card has two system status lights. A port card's FRAME DATA light illuminates to indicate the card's successful communication with the CPU card. A port card's STATUS light illuminates to indicate a failure in communication between the port card and the CPU card. When all port cards are lined up in the matrix, the system status lights form a horizontal row showing the overall state of the system.

PORT CARD FRONT-PANEL LIGHTS AND CONTROLS

① Reset Button

Pressing the reset button causes the card and all connected audio devices to momentarily stop their current activity and to restart. The card's "frame data" light goes off when the reset starts and comes back on when the reset is complete.

During the reset, configuration information downloads to the card and its connected audio devices from the CPU card. If the entire system is operating except for one port card, or one or more panels connected to the card, press the reset button for that card only.

Note: The reset button is slightly recessed from the front panel to prevent it from being accidentally pressed. You need a tool, such as a bent paper clip, to press this button.

② Power Supply Lights

+12-Volt and -12-Volt Power Supply Lights

The matrix's +12-volt and -12-volt power supplies provide electric current to these two green lights. When lit, these lights indicate that the matrix's +12-volt and -12-volt power supplies are present and supplying electric current to the card.

+5-Volt Power Supply Light

The matrix's +5-volt power supply provides electric current to this green light. When lit, the light indicates that the +5 supply is present and supplying electric current to the card.

+3.3-Volt Power Supply Light

The matrix's +3.3-volt power supply provides electric current to this green light. When lit, the light indicates that the +3.3-volt supply is present and supplying electric current to the card.

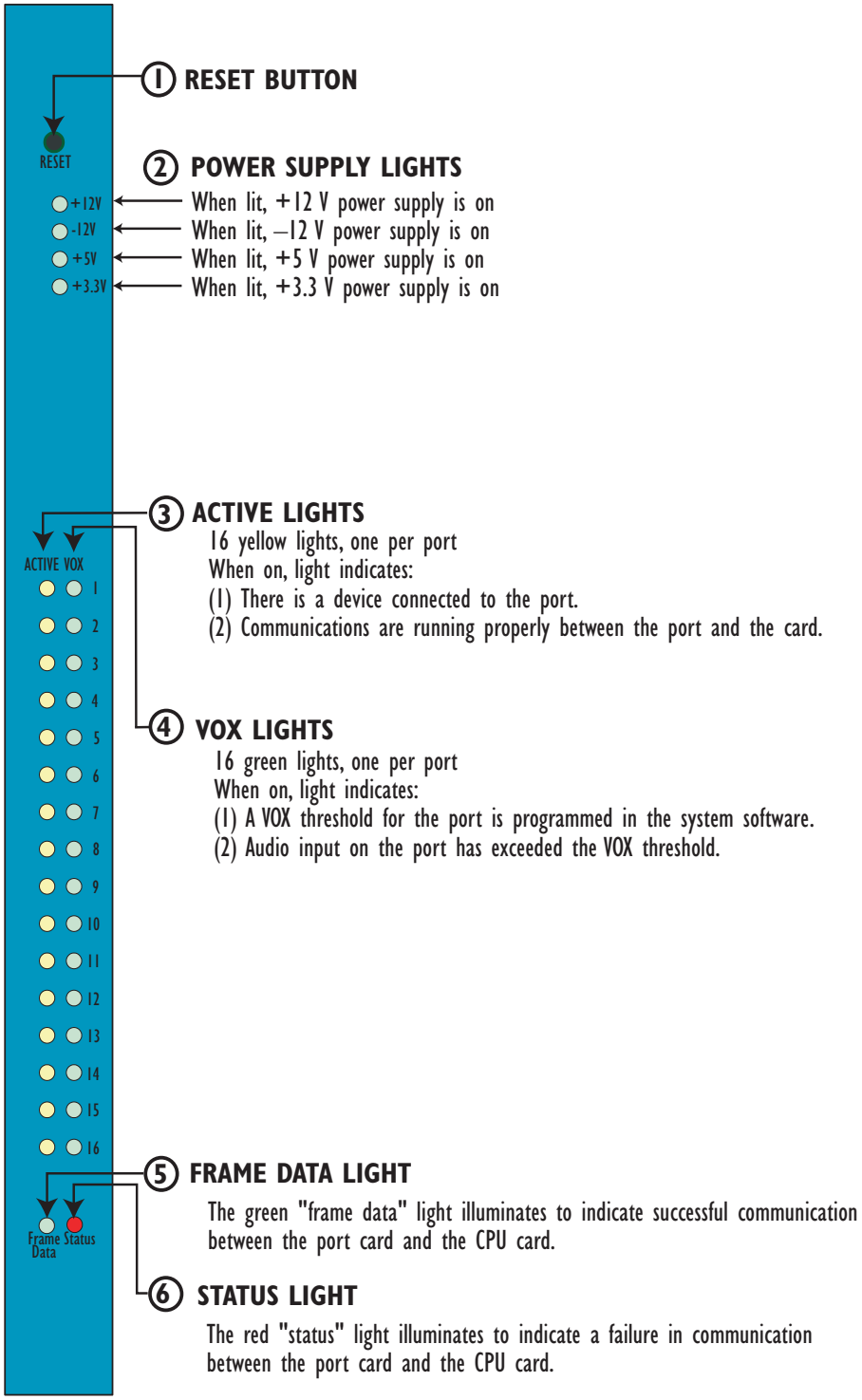

1 RESET BUTTON
RESET
2 POWER SUPPLY LIGHTS
+12V
When lit, +12 V power supply is on
-12V
When lit, –12 V power supply is on
+5V
When lit, +5 V power supply is on
+3.3V
When lit, +3.3 V power supply is on
3 ACTIVE LIGHTS
16 yellow lights, one per port
When on, light indicates:
(1) There is a device connected to the port.
(2) Communications are running properly between the port and the card.
ACTIVE VOX
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
4 VOX LIGHTS
16 green lights, one per port
When on, light indicates:
(1) A VOX threshold for the port is programmed in the system software.
(2) Audio input on the port has exceeded the VOX threshold.
5 FRAME DATA LIGHT
The green "frame data" light illuminates to indicate successful communication between the port card and the CPU card.
Frame Data
Status
6 STATUS LIGHT
The red "status" light illuminates to indicate a failure in communication between the port card and the CPU card.

Figure 2-3: Port Card's Lights and Controls

③ Active Lights

When lit, an “active” light indicates successful communication between the port card and a connected device such as an intercom panel or interface.

Each of the port card’s 16 yellow “active” lights corresponds to one of 16 rear-panel connectors or “ports” to which audio devices can be connected.

④ VOX Lights

When lit, a “VOX” light indicates that the audio level on a connected device, such as an intercom panel or interface, has exceeded a preset threshold. You set the threshold audio level through the ECS configuration software.

Each of the port card’s 16 green “VOX” lights corresponds to one of 16 rear-panel connectors or “ports” to which audio devices (intercom panels or interfaces) can be connected.

⑤ Frame Data Light

The green “frame data” light illuminates to indicate successful communication between the port card and the CPU card.

⑥ Status Light

The red “status” light illuminates to indicate a failure in communication between the port card and the CPU card.

POWER SUPPLY DESCRIPTION

Eclipse Omega has two Euro Cassette power supply units that you can easily install or remove as needed. One power supply unit can power an entire matrix; the second unit provides a backup in case of an equipment failure.

In addition, the two supplies have separate IEC connectors to AC mains power, and are designed for completely automatic and transparent changeover between supplies in the event of an outage on one of the AC mains circuits. For this feature to work, each power supply should be connected to a different AC mains branch.

If the temperature inside the Eclipse matrix exceeds a threshold, both an audible alarm and a warning light switch on, allowing you to diagnose and correct power anomalies while the system remains in operation.

Each cassette has two status lights located on the power supply unit in the upper left corner. The green light stays on continuously to let you know that the unit is receiving appropriate power. The amber light goes on when a DC output or AC input falls too low.

DIAGNOSING POWER SUPPLY PROBLEMS

Figure 2-4 illustrates the front panel alarm lights, power supply lights, and reset button. An alarm source triggers the main alarm light and also one of the additional six red alarm lights, allowing you to identify or correct alarm conditions before they affect the operation of the matrix.

Each of the four green power supply lights stays on continuously to show that the power supplies are receiving sufficient AC current. When one of these lights switches off, the power supplies need to be replaced or repaired.

Under normal operating conditions, the red front-panel alarm lights stay off, while the green power supply lights stay on continuously.

The power supplies may need to be adjusted if E-Que or fiber cards are installed. For details of the adjustments please refer to the system upgrade manual.

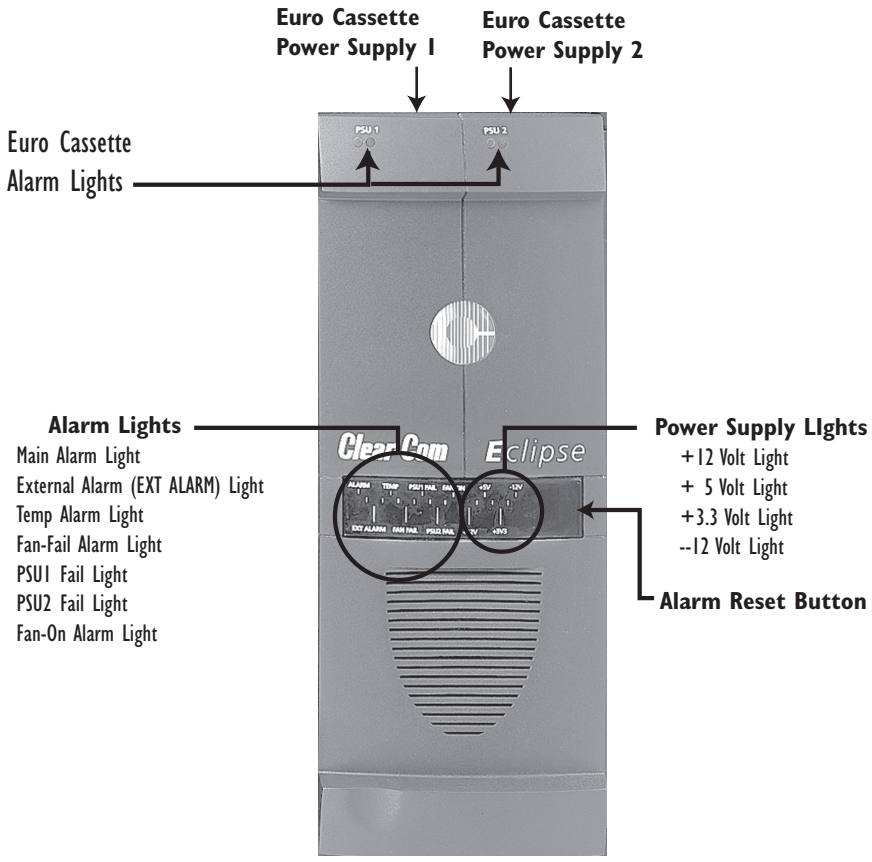


Figure 2-4: Power supply module's front door

CONDITIONS THAT CAUSE AN ALARM

The following conditions trigger an alarm:

- If any of the voltages produced by the first power supply unit fall below normal levels.
- If any of the voltages produced by the second power supply unit fall below normal levels.
- If an internal matrix alarm condition activates a matrix relay to turn on an external alarm.
- If the active CPU card exceeds a temperature threshold.
- If either of the CPU cards is removed from the matrix.
- If either of the matrix's two cooling fans stop operating.
- If the temperature inside the Eclipse matrix exceeds a set threshold.

MAIN ALARM LIGHT

An alarm condition triggers the following events:

- The red main alarm light flashes.
- The matrix's internal alarm buzzer sounds.
- Any installed alarm relay outputs switch to active (the normally open contact closes and the normally closed contact opens). When the alarm relay activates, it can cause an externally connected device like a light or buzzer to switch on.
- One of the six auxiliary red alarm lights may go on to more precisely indicate the source of the alarm condition. (These lights are discussed in further detail later in this section.)

ALARM RESET BUTTON

When you press the alarm reset button, the following events take place, even if the alarm condition has not been corrected:

- The internal audible alarm buzzer stops buzzing.
- Any wired relay contacts return to their inactive state. If these relays are connected to external alarm lights or alarm buzzers, those lights or buzzers shut off.

If the original alarm condition still exists, the red main alarm light on the matrix's front panel continues to flash. The red main alarm light only stops flashing when all original sources triggering the alarm are corrected.

If a new alarm condition or conditions occur before the original alarm conditions are corrected, the internal buzzer and relay contacts will not reactivate. They will only reactivate after all original alarm conditions are corrected.

AUXILIARY ALARM LIGHTS

When an alarm condition occurs, any of the six auxiliary alarm lights may switch on, in addition to the main alarm light, to help you diagnose the alarm condition. The following sections describe the six auxiliary alarm lights.

External Alarm ("Ext Alarm")

The "external" alarm (labelled "EXT ALARM") light switches on to indicate that an alarm condition has triggered the built-in relay outputs to turn on any externally installed alarms such as lights or bells. You connect the external alarm to the matrix through the 9-pin D-type connector on the matrix's rear panel labeled "Alarm I/O."

Temp Alarm

The red "temp" alarm light switches on to indicate one or both of the following:

- The active CPU card has detected a temperature in the matrix above a threshold.

- One of two CPU cards has been removed from the matrix. (Note that this feature only operates if there are two CPU cards installed in the matrix. If there is only one CPU card, the Temp alarm light does not switch on if the card is removed.)

Fan-Fail Alarm

The red fan-fail alarm light illuminates when either fan in the power-supply module stops rotating correctly.

PSU1 Fail

When the first power supply unit is operating correctly, the red PSU1 light stays off, while the four green power supply lights (+12V, +5V, +3.3V, -12V) stay on continuously.

If a DC output or AC input to the first power supply drops too low, the red PSU1 light switches on to warn you. (The amber light on the power supply unit itself also switches on to indicate the same condition.) One of the green power supply lights may then switch off to help indicate the source of the trouble.

Note that the PSU1 fail light only works if the first power supply is plugged into the matrix's midplane from inside the matrix.

Note: A temperature sensor inside the power supply senses if the power supply overheats, and switches on the second matrix cooling fan. The red "Temp" light switches on to indicate that the active CPU card, not a power supply, has overheated.

PSU2 Fail

When the second power supply unit is operating correctly, the red PSU2 light is off, while the four green power supply lights (+12V, +5V, +3.3V, -12V) are on continuously.

When a DC output or AC input to the second power supply drops too low, the red PSU2 light switches on to warn you. (The amber light on the power supply unit itself also switches on to indicate the same condition.) One of the green power supply lights may then switch off to help indicate the source of the trouble.

Note that the PSU2 fail light only works if the second power supply is plugged into the matrix's midplane from inside the matrix.

Note: A temperature sensor inside the power supply senses if the power supply overheats, and switches on the second matrix cooling fan. The red "Temp" light switches on to indicate that the active CPU card, not a power supply, has overheated.

Fan-On Indicator

Two fans deliver forced air cooling to the matrix's power supplies. The primary fan runs continuously. If a temperature exceeding a threshold is detected in a power supply and extra cooling is required, a second fan switches on to increase the air flow. The "fan-on" alarm light illuminates red to indicate that the second fan is on.

POWER SUPPLY LIGHTS

The green power-supply lights illuminate to indicate that the power supplies are receiving +12 V, –12 V, +5 V, and 3.3 V power.

CONNECTING THE MATRIX

The Eclipse Omega matrix connects to devices such as the configuration computer, panels, interfaces, and other matrices through its rear-panel hardware connectors, often called "ports." These connectors are housed in modular removable panels. Each panel is associated with a corresponding front-panel circuit card.

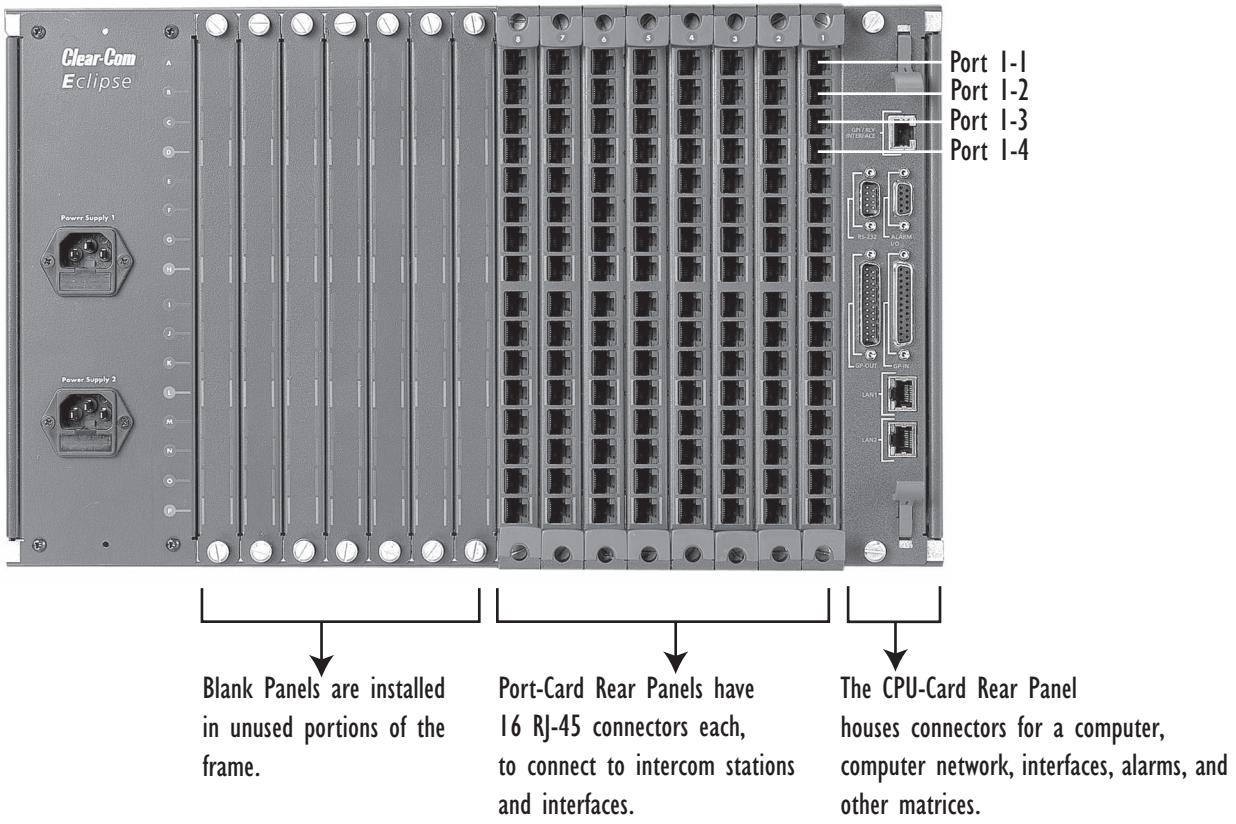

Clear-Com
Eclipse
Powrr Supply 1
Power Supply 2
Port 1-1
Port 1-2
Port 1-3
Port 1-4
Blank Panels are installed in unused portions of the frame.
Port-Card Rear Panels have 16 RJ-45 connectors each, to connect to intercom stations and interfaces.
The CPU-Card Rear Panel houses connectors for a computer, computer network, interfaces, alarms, and other matrices.

Figure 2-5: The Eclipse houses three types of rear-connector panels

There are five types of rear-connector panels:

- A CPU-card rear panel holds the various connectors associated with the CPU card, such as the RS-232 connector for the configuration computer. This panel's connectors are discussed in the next section, titled "Rear-Connector CPU Card."
- A port-card rear panel holds the sixteen RJ-45 connectors associated with its corresponding front-panel port card. Intercom panels and interfaces connect to the matrix through this rear-connector panel.
- A fiber card provides two ports to connect fiber network cables.
- An E-Que card provides eight RJ-45 ports for connection to wireless equipment and three RJ-45 ports for DECT sync and LAN connections.
- A blank panel covers an unused slot in the matrix.

You can precisely locate a port with its column and row number.

CONNECTING THE CPU CARD

The rear-connector panel associated with the CPU card holds seven connectors, as illustrated in Figure 6. The following sections describe each connector. The Installation Chapter of this manual gives pin assignments for each connector.

Note: A matrix only requires one rear-panel CPU card, because whichever of the two front-installed CPU cards is acting as master will work in conjunction with this card. All other cards, however, require their own rear-connector panel.

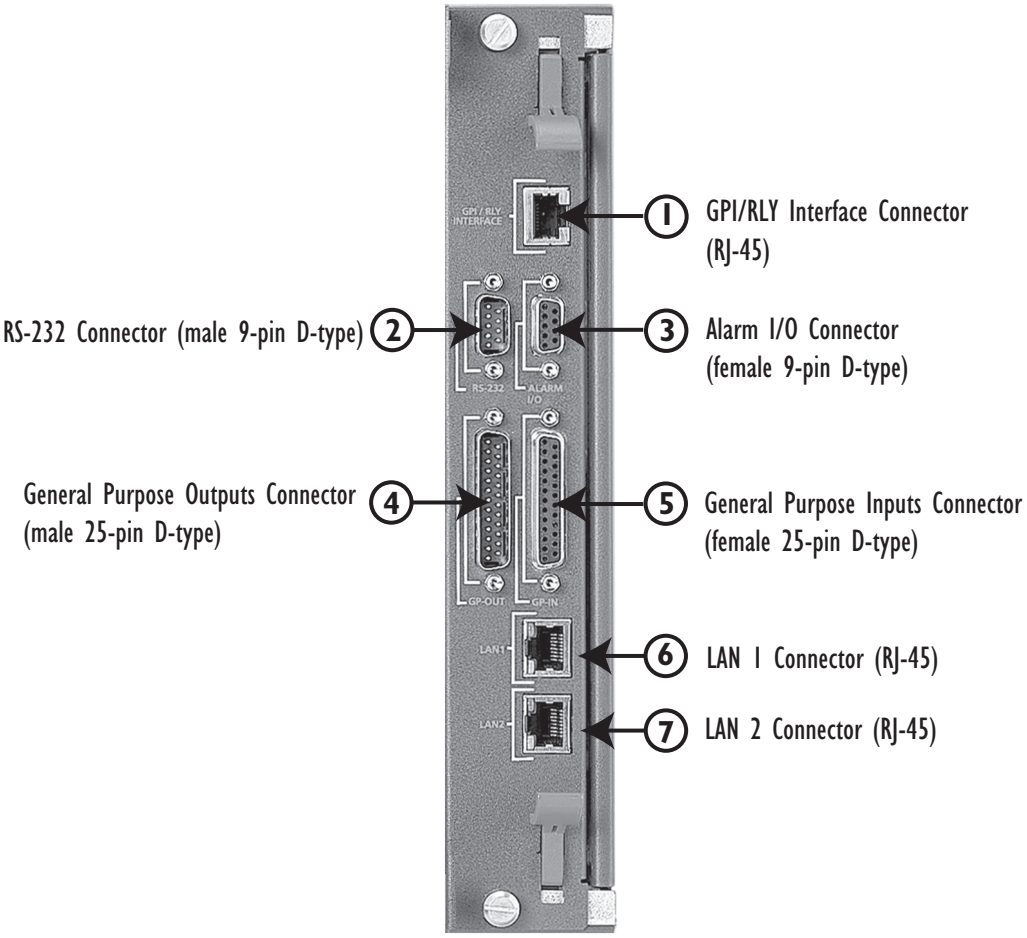


Figure 2-6: CPU Card's Rear-Connector Panel

① GPI-RLY INTERFACE CONNECTOR

The RJ-45 socket labeled "GPI/RLY Interface" connects the CPU card to a GPI-6 or RLY-6 card. The GPI-6 provides six general-purpose opto-isolated logic inputs. The RLY-6 card provides six single-pole, double-throw relay outputs.

Both card types mount in either an IMF-3 interface frame or an IMF-102 interface frame. You can operate up to ten GPI-6 or RLY-6 cards at one time

from the matrix by daisy-chaining the cards together. Each card has an IN and an OUT connector for this purpose.

The RLY-6 and GPI-6 cards connect to the GPI/RLY interface connector using shielded category-5 cable. For more information about the GPI-6 and RLY-6 cards, consult their respective manuals in the Eclipse Omega manual set.

② RS-232 CONNECTOR

The female 9-pin D-type socket labeled "RS-232" connects the CPU card to an external computer.

③ ALARM I/O CONNECTOR

The female 9-pin D-type socket labeled "Alarm I/O" connects the Eclipse matrix to an external alarm indicator, such as a light or buzzer and/or to an external alarm source.

④ GENERAL-PURPOSE OUTPUTS CONNECTOR ("GP OUT")

The male 25-pin D-type socket labeled "GP OUT" connects the CPU card to eight general purpose outputs (GPOs). General-purpose outputs are single-pole double-throw relays with contact ratings of 30 VDC (volts direct current) at 1 ampere.

A general purpose output or "relay" is a switch that you control remotely. You program the relay in the ECS configuration program to close a contact whenever an intercom panel's key is pressed. When the contact is closed, it completes an electronic circuit's signal path so that a remote device, such as a light, is powered.

You can program a GPO to mute a speaker, to turn on an applause light, to turn on a door lock, or to perform a variety of other functions. For example, to get the attention of a panel operator working in a high-noise environment such as a control booth, you can program a relay to switch on a light at his panel each time he receives an incoming call, to ensure that he will not miss the call.

Note: If you use the GP-OUT port, you must fit the following filter between the PROC-RCC socket and the cable:

CINCH FA-25PS/1 25W D-type in-line 1000pF filter

(UK supplier: Farnell 322-2676)

⑤ GENERAL-PURPOSE INPUTS CONNECTOR ("GP IN")

The female 25-pin D-type socket labeled "GP IN" connects the Eclipse Omega CPU card to eight general purpose inputs (GPIs).

You can connect an external logic device–such as an external foot switch, a panel-mounted switch, or the logic output of some other device–to the "GP IN" connector. When the external logic device is activated, it sends a control signal into the matrix to perform one of several preset functions, such as turning an

intercom panel's microphone on or off, muting a microphone's output, or turning a panel's speaker off. You choose the function to perform and the panel upon which it is performed from the assignment program.

⑥ LOCAL AREA NETWORK 1 CONNECTOR ("LAN 1")

The RJ-45 socket labeled "LAN 1" connects a local area network (LAN) to the CPU card through a standard Ethernet connection. The green LED indicates the port is connected and the amber LED indicates activity.

If you use this port, you must add a ferrite to the socket end of each cable. A suitable ferrite is Würth Electronik part: 74271132. "

⑦ LOCAL AREA NETWORK 2 CONNECTOR ("LAN 2")

The RJ-45 socket labeled "LAN 2" connects a second local area network (LAN) to the CPU card through a standard Ethernet connection. The green LED indicates the port is connected and the amber LED indicates activity.

If you use this port, you must add a ferrite to the socket end of each cable. A suitable ferrite is Würth Electronik part: 74271132.

CONNECTING PORT CARDS

Each rear-connector panel associated with an MVX-16 port card holds the sixteen RJ-45 connectors that connect the matrix to intercom panels and interfaces. Each front-installed MVX-A16 port card requires a corresponding rear-connector panel. Blank panels cover unused slots.

You can locate and identify each port on the matrix by using the rear-panel numbering grid.

- Columns 1 through 15 identify cards.
- Rows 1 through 16 identify ports on each card.
- Processor cards are designated P1 and P2.

You can identify a port precisely by identifying its card number and port number on the card. For exaample, the ports on the first card are designated 1-1, 1-2, 1-3, 1-4, and so on; the ports on the second card are designated 2-1, 2-2, 2-3, 2-4, and so on.

Each rear-connector panel associated with a fiber card hold two fiber connection ports. Each front-installed E-FIB card requires a corresponding rear-connector panel.

Each rear connector panelassociated with an E-Que card hold eleven RJ-45 ports:

- Eight ports for connection to wireless equipment.
- Two ports for DECT sync.
- One port for LAN interface.

3 ECLIPSE FIBER CARD LINKING

FIBER CARD DESCRIPTION

E-FIB fiber cards connect Eclipse matrices together to provide a high speed, dual redundant link to transfer audio samples and data between systems. These connections can be configured in various ways to provide protection against the loss of a link or a node.

Each fiber card link consists of a front card with various status indicators and a rear card with two Duplex LC Terminated fiber optic connectors (TXVRA and TXVRB). The fiber cards use Simplex fiber optic cables.

Each fiber optic front card has a reset button, status LEDs for power, processor function, card status, link status and link activity. The link status and activity LEDs indicate whether there is activity on a link, whether the card is transmitting on a link and the error state of a link.

Normally fiber cards should be fitted in slots 14 and/or 15 of an Omega matrix. If fiber cards are fitted to any matrix in a linked system all the linked matrices must be reset to ensure that all matrices correctly recognise the new hardware.

E-FIB FIBER CARD FRONT-PANEL LIGHTS AND CONTROLS

① Reset Button

Pressing the reset button causes the card and all links to momentarily stop their current activity and to restart. The card's "frame data" light goes off when the reset starts and comes back on when the reset is complete.

During the reset, configuration information downloads to the card and its connected matrices from the CPU card. If the entire system is operating except for one fiber card press the reset button for that card only.

NOTE: The reset button is slightly recessed from the front panel to prevent it from being accidentally pressed. You need a tool, such as a bent paper clip, to press this button.

② Power Supply & Status Lights

+3.3-Volt Power Supply LED

The matrix's +3.3-volt power supply provides electric current to this green light. When lit, the light indicates that the +3.3-volt supply is present and supplying electric current to the card.

Processor LED

When lit the LED indicates that the fiber card on-board processor is running

Front Card LED

When lit indicates that the front card in functioning normally.

Rear Card LED

When lit indicates that the rear card is functioning normally.

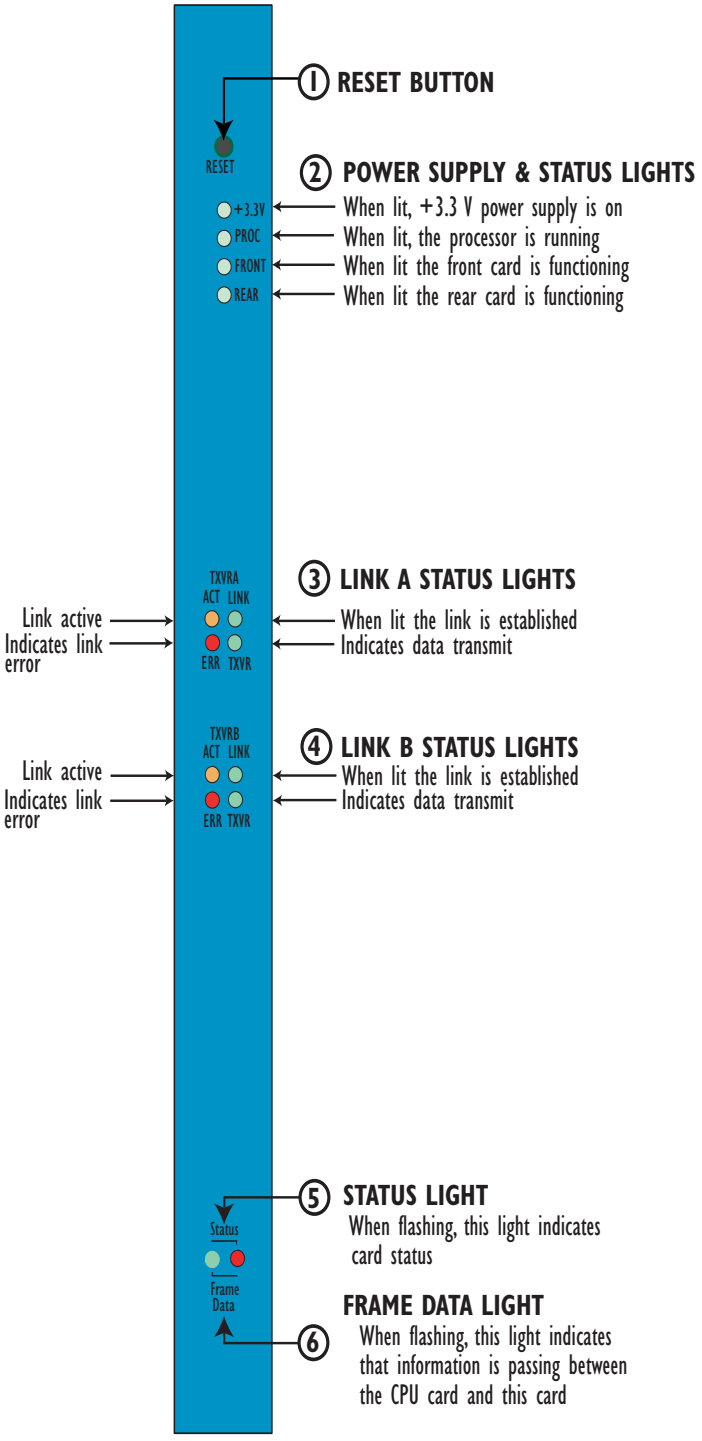


Figure 3-1: Front Fiber Card

③ Primary Link Status LEDs

These LEDs indicate the status and functioning of the primary (A) fiber optic link.

Link LED

This LED indicates whether a link has been established on the primary fiber optic circuit (transceiver A). When illuminated a link is present.

TXVR LED

This LED indicates when data is being transmitted on the primary circuit. It is illuminated when data is present on the circuit.

ACT LED

This LED is lit if the primary fiber optic circuit is active.

ERR LED

This LED will be illuminated if an error condition is detected on the primary fiber optic circuit.

④ Secondary Link Status LEDs

These LEDs indicate the status and functioning of the secondary (B) fiber optic link.

Link LED

This LED indicates whether a link has been established on the secondary fiber optic circuit (transceiver A). When illuminated a link is present.

TXVR LED

This LED indicates when data is being transmitted on the secondary circuit. It is illuminated when data is present on the circuit.

ACT LED

This LED is lit if the secondary fiber optic circuit is active.

ERR LED

This LED will be illuminated if an error condition is detected on the secondary fiber optic circuit.

⑤ Status LED

The green “frame data” LED illuminates to indicate successful communication between the fiber master card and the CPU card.

⑥ Frame Data LED

The red “status” light illuminates to indicate a failure in communication between the fiber card and the CPU card.

FIBER CARD REAR PANEL LIGHTS AND CONNECTIONS

The fiber card rear card contains a single power supply indicator LED and two fiber connectors.

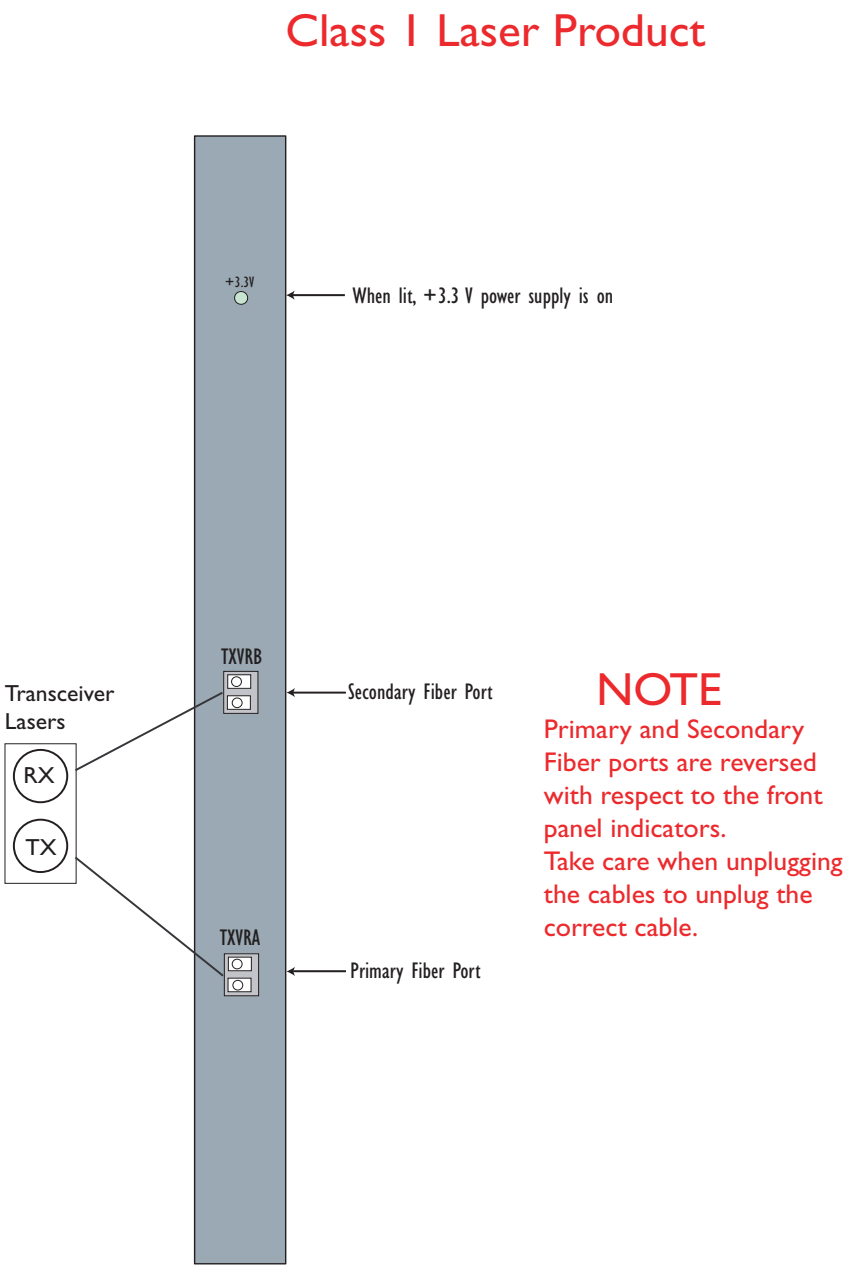


Figure 3-2: Rear Fiber Card

The fiber optic cable for the primary and secondary circuits are plugged into the appropriate ports.

Eye Safety

This laser based single mode transceiver is a Class 1 product. It complies with IEC 60825-1/A2:2001 and FDA performance standards for laser products (21 CFR 1040.10 and 1040.11) except for deviations pursuant to Laser Notice 50, dated July 26, 2001.

Note: The order of the fiber optic cable connections is reversed between the front and rear panels. On the front panel the primary connection is the upper set of indicators but on the rear panel it is the lower connector. Similarly the secondary connetion is the lower set of indicators on the front panel but the upper connector on the rear panel. Care should be taken when connecting or disconnecting the cables to ensure that they are connected correctly and not reversed.

Note: Normally a protective plug is fitted to the fiber connector sockets to protect them from damage or the entry of foregn materials. These should only be removed in order to fit the fiber optic cable and replaced if the cable is unplugged.

CONFIGURING A FIBER OPTIC CONNECTION

There are a number of ways that optical connections can be made between systems depending on the level of redundancy required.

When a break occurs in the fiber ring, a solid red status light will be shown at the fiber card downstream from the break and the link status LEDs may show amber. Other fiber cards will intermittently show red, as the ring attempts to recover. If the system layout is displayed by ECS the faulty links are shown in red.

In order to diagnose faults or switch between primary and secondary rings or between primary and backup fiber linking cards the My Systems in ECS must be used. Ensure that the current configuration is open and click on 'Live Status' in the My Systems toolbar to display the current system state.

This will allow the operator to intevene to alter the system configuration as required. For details of ECS please refer to the ECS instruction manual (part number 810299).

SIMPLEX FIBER CABLING

Single Card Set Redundancy

In this case each Matrix Frame contains one fiber-optic Linking card set . This is shown as in Figure 3-3. This approach still affords fiber connection redundancy since each rear card houses two fiber-optic transceivers.

In the absence of an Uninterruptible Power Supply this configuration will not protect against loss of the node or Matrix Frame itself.

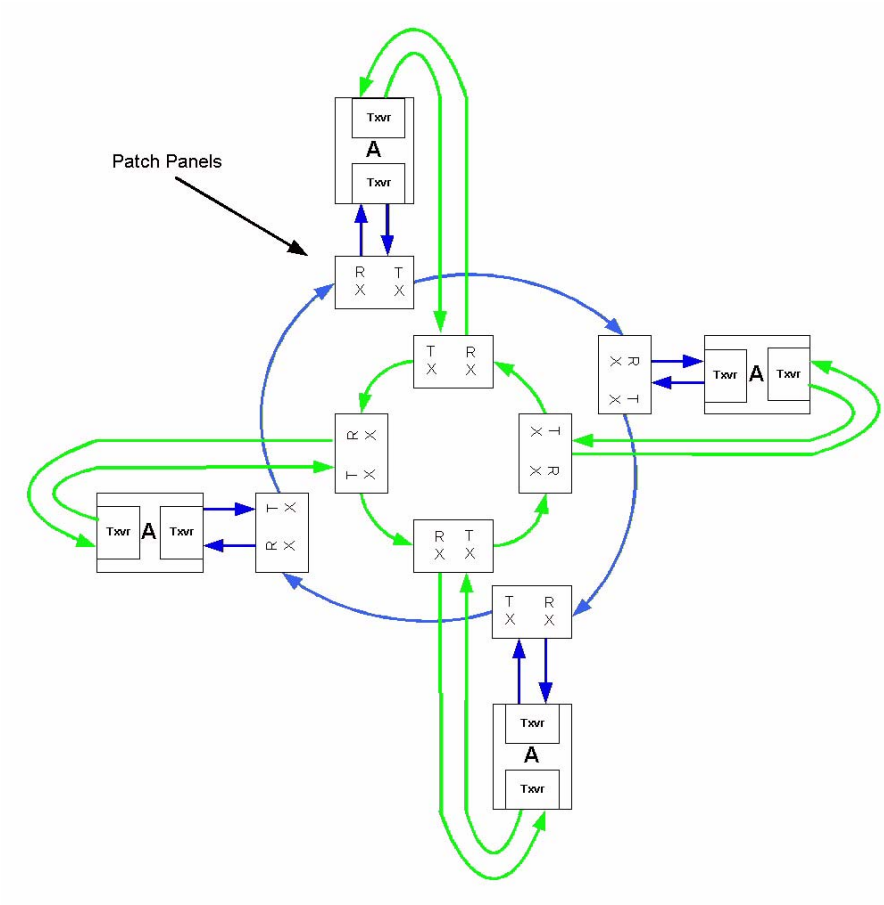


Figure 3-3: Ring Topology Single Card Set Redundancy

Loss of Single Fiber Connection

If a single fiber connection is lost on one ring and the other ring is intact then the active ring always attempts to heal itself by reversing the direction of data flow to bypass the failed connection. If the extent of the failure is such that the active ring is unable to heal itself then the system will switch to the secondary ring.

The self healing mechanism is performed automatically by the Fiber Linking Card whereas the switch-over between redundant cards and rings requires software or operator intervention. Switching to the secondary ring will cause audio breaks or disturbances and temporary loss of crosspoint data.

If a single fiber connection is lost on both rings the nodes adjacent to the failures will loop-back their connections to the failed cables healing the rings and the most intact ring will be used.

The Eclipse Configuration Software (ECS) will report any failures in the fiber connection system.

Loss of a Single Node

If a node is lost on the ring the nodes adjacent to the failed node will loop-back their connections to the failed node healing the ring using the working remains of the ring. The configuration software (ECS) will report the failure.

This applies to the situation where the fiber card itself has failed rather than the matrix.

Loss of Two Fiber Connections

If two adjacent fiber connections are lost on the ring this will be handled as for the loss of a single node where the nodes adjacent to the failed node will loop-back their connections to the failed node healing the ring. The configuration software will report the failure correctly as two failed cables . If two non-adjacent fiber connections are lost on the ring the nodes adjacent to the failures will loop-back their connections to the failed cables healing the ring into 2 separate smaller rings. The configuration software will report the failure.

Note that in this instance the two sub-rings will be dependent on their Ethernet connections for configuration and data transmission but there will be no audio path between them.

Loss of Two Nodes

If two adjacent nodes are lost on the ring this will be handled as for the loss of a single node where the nodes adjacent to the failed node will loop-back their connections to the failed nodes healing the ring. The configuration software will report the failure correctly as two failed nodes . If two non-adjacent nodes are lost on the ring the nodes adjacent to the failures will loop-back their connections to the failed nodes healing the ring into 2 separate smaller rings. The configuration software will report the failure. Note that in this instance the two sub-rings will be dependent on their Ethernet connections for configuration and data transmission but there will be no audio path between them

DUAL CARD SET REDUNDANCY

This is shown as in Figure 3-4 with both " Card set A" and "Card set B" fitted in each node of the ring. In this case each Matrix Frame contains two Fiber-optic Linking card sets. This approach affords full redundancy, offering protection against component failure within a single Fiber-optic Linking Card Set. Again in the absence of an Uninterruptible Power Supply this configuration will not protect against loss of the node or Matrix Frame itself.

Loss of Single Fiber Connection

If a single fiber connection is lost on one ring and the other ring is intact then the active ring always attempts to heal itself by reversing the direction of data flow to bypass the failed connection. The self healing mechanism is performed autonomously by the fiber linking card

If the extent of the failure is such that the active ring is unable to heal itself the the system will switch to the secondary ring. Switching to the secondary ring will cause audio breaks or disturbances and temporary loss of crosspoint data.

The self healing mechanism is performed automatically by the fiber linking card whereas the switch-over between redundant cards and rings requires software or operator intervention.

Loss of a Single Node

If a node is lost on one ring due to a single fiber-optic linking card set failure and the fiber-optic linking card set for the other ring is healthy and the other ring is intact then the active ring always attempts to heal itself. The nodes adjacent to the failed node will loop-back their connections to the failed node healing the ring using the working remains of the ring.

If the extent of the failure is such that the active ring is unable to heal itself the the system will switch to the secondary ring. Switching to the secondary ring will cause audio breaks or disturbances and temporary loss of crosspoint data.

The self healing mechanism is performed autonomously by the fiber linking card whereas the switch-over between redundant cards and rings requires software or operator intervention.

If a single node is lost on both rings due to multiple fiber-optic linking card set failures etc the nodes adjacent to the failed node(s) will loop-back their connections to the failed node(s) healing the rings and the most intact ring will be used. The configuration software will report the failure.

Loss of Two Fiber Connections

f two adjacent fiber connections are lost on the ring this will be handled as for the loss of a single node where the nodes adjacent to the failed node will loop-back their connections to the failed node healing the ring. The configuration software will report the failure correctly as two failed cables . If two non-adjacent fiber connections are lost on the ring the nodes adjacent to the failures will loop-back their connections to the failed cables healing the ring into 2 separate smaller rings. The configuration software will report the failure.

Note that in this instance the two sub-rings will be dependent on their Ethernet connections for configuration and data transmission but there will be no audio path between them.

Switching to the secondary ring will cause audio breaks or disturbances and temporary loss of crosspoint data. The self healing mechanism is performed autonomously by the fiber Linking Card whereas the switch-over between redundant cards and rings requires software or operator intervention.

If two adjacent fiber connections are lost on one ring and the other ring has a similar failure this will be handled as for the loss of a single node where the nodes adjacent to the failed node will loop-back their connections to the failed node healing the ring. The configuration software will report the failure correctly as two failed cables . If two non-adjacent fiber connections are lost on one ring and the other ring has a similar fault the nodes adjacent to the failures will loop-back their connections to the failed cables healing the ring into 2 separate smaller rings. The configuration software will report the failure.

Note that in this instance the two sub-rings will be dependent on their Ethernet connections for configuration and data transmission but there will be no audio path between them.

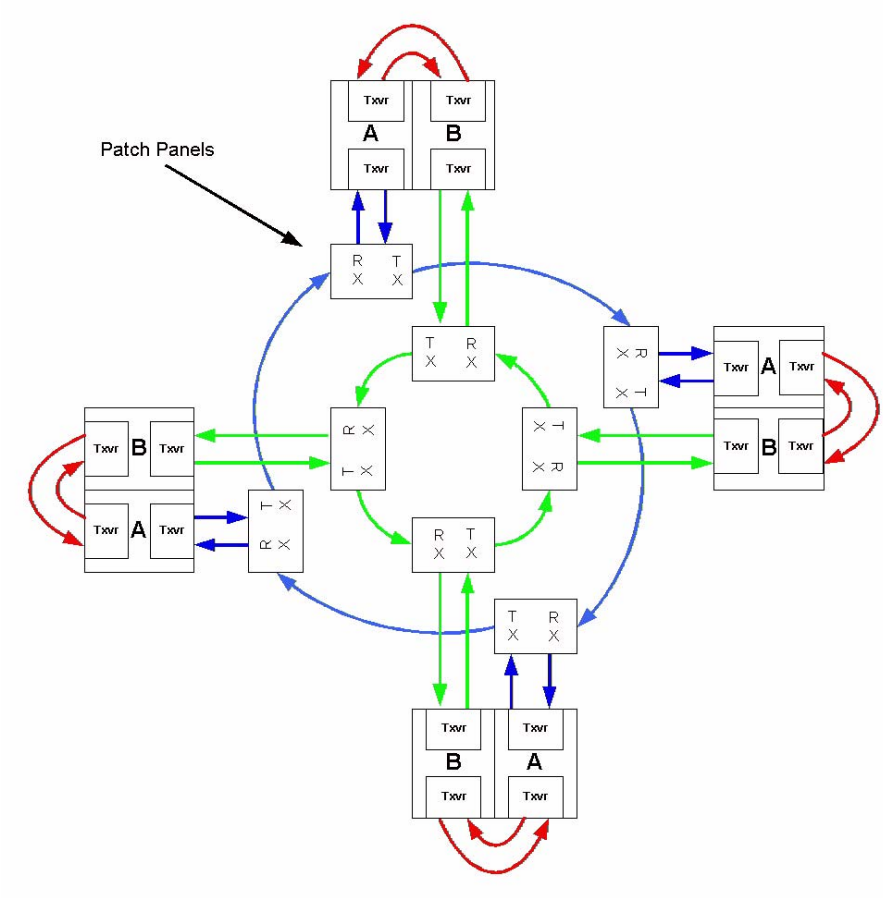


Figure 3-4: Ring Topology Dual Card Set Redundancy

Loss of Two Nodes

If two adjacent nodes are lost on the ring this will be handled as for the loss of a single node where the nodes adjacent to the failed node will loop-back their connections to the failed nodes healing the ring. The configuration software will report the failure correctly as two failed nodes . If two non-adjacent nodes are lost on the ring the nodes adjacent to the failures will loop-back their connections to the failed nodes healing the ring into 2 separate smaller rings. The configuration software will report the failure. Note that in this instance the two sub-rings will be dependent on their Ethernet connections for configuration and data transmission but there will be no audio path between them

Switching to the secondary ring will cause audio breaks or disturbances and temporary loss of crosspoint data. The self healing mechanism is performed autonomously by the fiber linking card whereas the switch-over between redundant cards and rings requires software or operator intervention.

If two adjacent nodes are lost on one ring and the other ring has a similar fault this will be handled as for the loss of a single node where the nodes adjacent to the failed node will loop-back their connections to the failed nodes healing the ring. The configuration software will report the failure correctly as two failed nodes. If two non-adjacent nodes are lost on one ring and the other ring has a similar fault the nodes adjacent to the failures will loop-back their connections to the failed nodes healing the ring into 2 separate smaller rings. The configuration software will report the failure. Note that in this instance the two sub-rings will be dependent on their Ethernet connections for configuration and data transmission but there will be no audio path between them.

Fiber-Optic Linking Card Failure

This will be handled as for loss of a single node above. The configuration software will report the failure.

FAULT TOLERANCE

Dual Card Set Redundant System - Full Redundancy

In the event of single or multiple cable fault or loss of node conditions occurring on one ring whilst the other ring remains intact the active ring always attempts to heal itself.

Switching to the secondary ring will cause audio breaks or disturbances and temporary loss of crosspoint data. The self healing mechanism is performed autonomously by the fiber linking card whereas the switch-over between redundant cards and rings requires software or operator intervention.

In all fault cases involving recoverable cable faults or loss of nodes on one or both both rings the remaining nodes may experience audio breaks or disturbances and temporary loss of crosspoint information or data. Audio and data from a failed node will not be available to the remaining nodes for the duration of the failure. When a ring with non-adjacent failures sub-divides into two sub-rings, audio and data from the failed nodes will not be available to the nodes in either sub-ring , audio and data will continue to be available to nodes within the same sub-ring but data may still be available to all nodes that are still functioning if there is an intact, independent Ethernet connection to those nodes.

If a Matrix frame, connected as a node of the fiber-optic link is reset, powered down or failed this will constitute a lost or failed node on both rings and this node will experience audio breaks or disturbances and loss of crosspoint information or data for up to 5 seconds after the fault condition is cleared or repaired.

Single Card Set Redundant System - Fiber Redundancy

In all fault cases involving cable faults or loss of nodes on the ring the remaining nodes may experience audio breaks or disturbances and loss of crosspoint information or data. When a ring with non-adjacent failures sub-divides into two sub-rings, audio and data from the failed nodes will not be available to the nodes in either sub-ring , audio and data will continue to be

available to nodes within the same sub-ring but data may still be available to all nodes that are still functioning if there is an intact, independent Ethernet connection to those nodes.

If a Matrix frame, connected as a node of the fiber-optic link is reset, powered down or failed this will constitute a lost or failed node on the ring and this node will experience audio breaks or disturbances and loss of crosspoint information or data for up to 5 seconds after the fault condition is cleared or repaired.

4 ECLIPSE E-QUE CARD

E-QUE CARD DESCRIPTION

The E-QUE card allows the Eclipse matrix connectivity to FreeSpeak/CellCom antennas and FreeSpeak/CellCom antenna splitters. The connection options supported are:

- 8 x FreeSpeak/CellCom antenna direct connections
- 2 x FreeSpeak/CellCom splitter connections (up to 5 antennas each)

Up to 40 antennas and 200 beltpacks can be connected to a matrix using E-Que cards.

Each E-Que card set consists of a front card with a reset button and various status indicators, and a rear card with eleven RJ45 ports giving eight standard ports, DECT sync in and out and a LAN port.

Each E-Que front card has status LEDs for power, port activity and LAN status. The port activity LEDs indicate whether there is a device connected to an E1 port and that a connection has been established between this port and the connected device.

The E-Que cards must be fitted in the rightmost available slots on the Omega (furthest from the config cards) and up to four E-Que cards can be fitted on a matrix.

Note: It is not necessary to have an ethernet cable connected to the E-Que card LAN port for the card to function correctly.

E-QUE CARD FRONT-PANEL LIGHTS

① Reset Button

Pressing the reset button causes the card and all links to momentarily stop their current activity and to restart.

During the reset, configuration information downloads to the card from the CPU card. If the entire system is operating except for one E-Que card press the reset button for that card only.

Note: The reset button is slightly recessed from the front panel to prevent it from being accidentally pressed. You need a tool, such as a bent paper clip, to press this button.

② Power Supply & Status Lights

+3.3-Volt Power Supply Light

The matrix's +3.3-volt power supply provides electric current to this green light. When lit, the light indicates that the +3.3-volt supply is present and supplying power to the card.

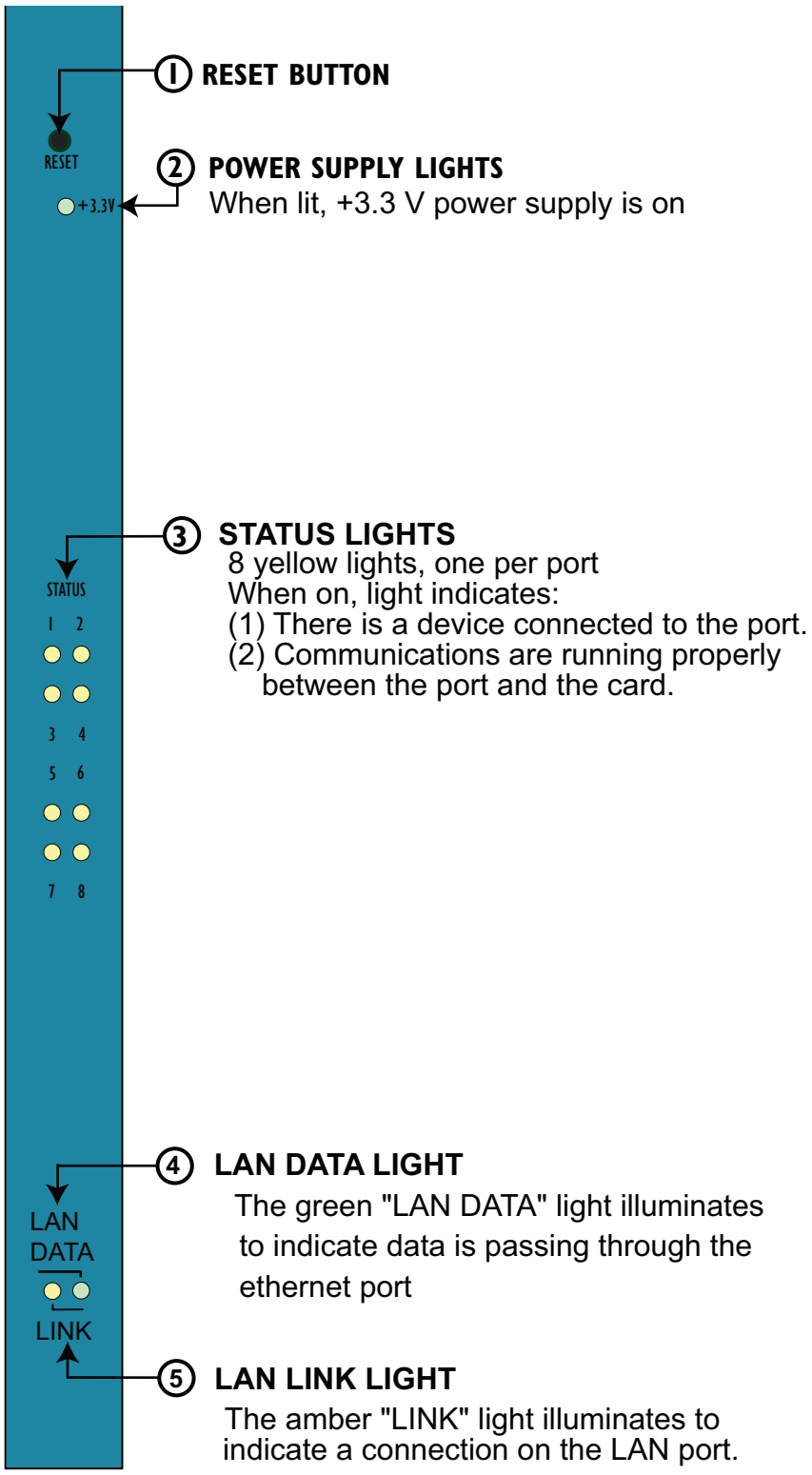

1 RESET BUTTON
RESET
2 POWER SUPPLY LIGHTS
When lit, +3.3 V power supply is on
+3.3V
3 STATUS LIGHTS
8 yellow lights, one per port
When on, light indicates:
(1) There is a device connected to the port.
(2) Communications are running properly between the port and the card.
STATUS
1 2
3 4
5 6
7 8
4 LAN DATA LIGHT
The green "LAN DATA" light illuminates to indicate data is passing through the ethernet port
LAN
DATA
LINK
5 LAN LINK LIGHT
The amber "LINK" light illuminates to indicate a connection on the LAN port.

Figure 4-1: Front E-Que Card

③ Status Lights

When lit, a “status” light indicates successful communication between the E-Que card and a connected device such as an active antenna or splitter.

Each of the E-Que card’s 8 yellow “status” lights corresponds to one of 8 ports to which devices can be connected.

④ LAN Data Light

The green “LAN DATA” light illuminates to indicate there is data passing through the ethernet port.

⑤ LAN Link Light

The amber “LAN LINK” light illuminates to indicate a connection to the LAN port.

E-QUE CARD REAR CONNECTIONS

The E-Que card rear card contains eleven RJ45 connectors; 8 E1/T1 ports, 2 DECT sync ports and a LAN port.

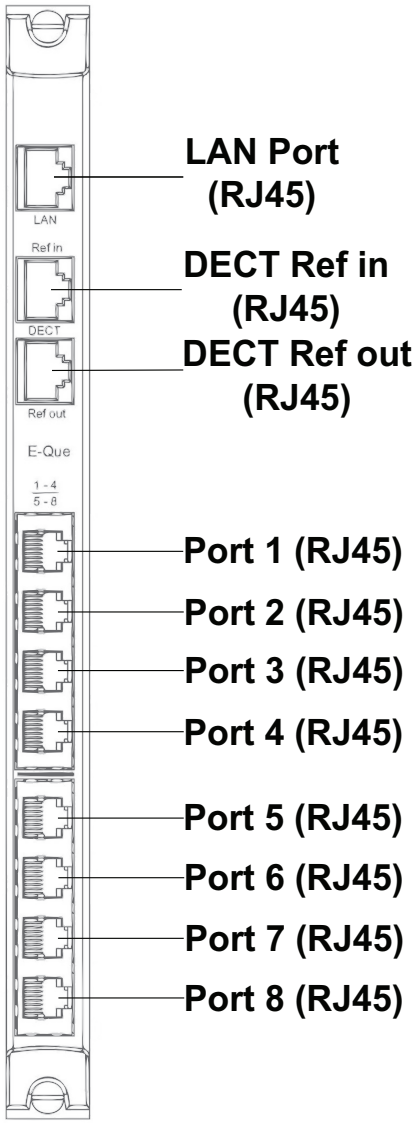


Figure 4-2: Rear E-Que Card

When multiple E-Que cards are fitted in a rack, one of the cards generates a clock signal, which all othe cards lock to, to ensure that all antennas remain in sync. The system is designed such that the leftmost card (seen from the front) is always the one which generates this signal. This means that if the leftmost card is removed, or a new card is fitted to the left of existing cards, the antennas will lose lock for a few seconds as the cards re-configure themselves and a new card starts generating the sync signal.

Where multiple connected matrices are used containing E-Que cards the DECT reference ports are connected as a daisy chain between the matrices to ensure that the DECT signals are synchronised through all the E-Que cards present in the matrices.

The LAN port is used for diagnostic purposes.

E-QUE CARD APPLICATIONS

The E-Que card may be used to connect FreeSpeak/CellCom antennas and splitters to an Eclipse matrix system.

FREESPEAK/CELLCOM APPLICATION

The E-Que cards can be configured for FreeSpeak/CellCom use in two modes depending on whether antennas or splitters are to be connected.

If the E-Que card is configured in 'Antenna' mode all eight E1/T1 ports can be used to connect up to eight antennas. If the E-Que card is configured to support splitters only two ports are active (ports 1 and 5) allowing a maximum of two splitters to be connected. Each splitter can support up to five antennas.

There connections schemes are illustrated below.

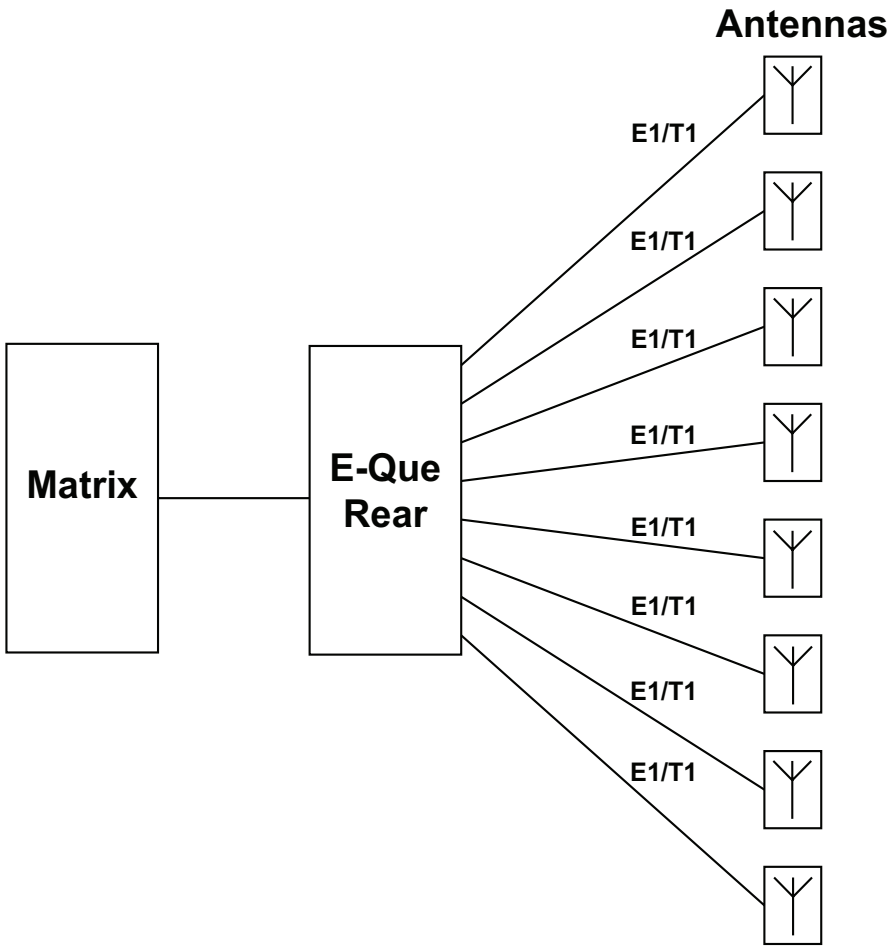


Figure 4-3: E-Que Card Antenna Connection

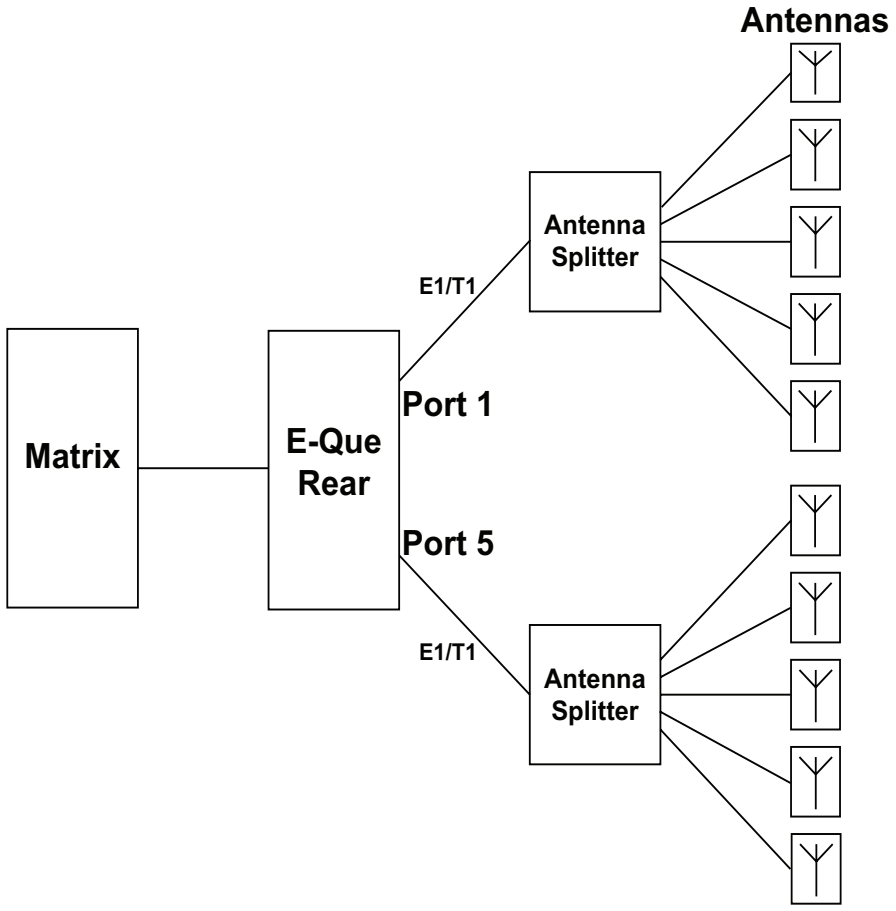


Figure 4-4: E-Que Card Splitter Connection

Each antenna can handle up to five beltpacks simultaneously and switch service between antennas under control of the matrix as the beltpack user moves around the site.

Where multiple matrices are networked together with antennas or splitters connected to E-Que cards on more than one matrix the E-Que cards should have the DECT Sync links between matrices to ensure the correct operation of the FreeSpeak/CellCom system.

Multiple E-Que cards within a single matrix do not need to have external DECT sync cables connected as the signal uses the backplane.

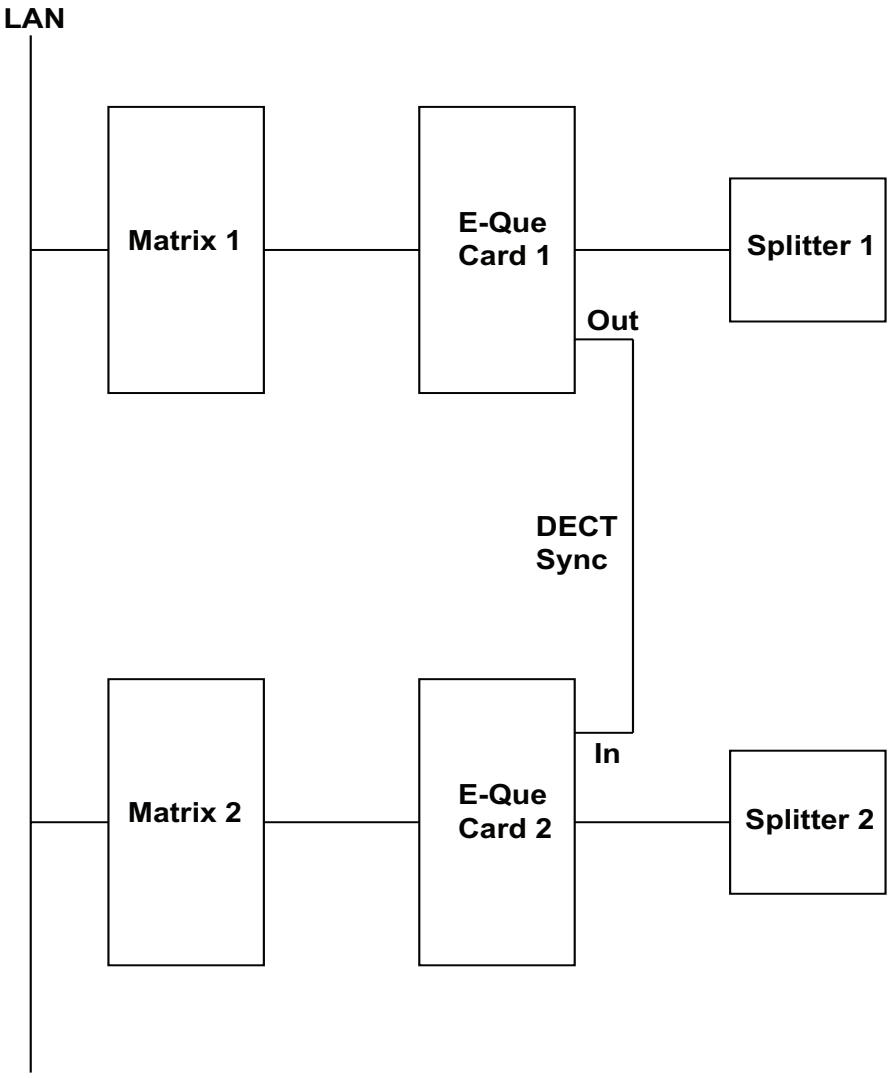


Figure 4-5: Multiple Matrices with DECT Sync Interconnect

All connections are made using CAT5 cable and it is recommended that shielded cable is used.

Note: If an E-Que card is fitted in the Omega with antennae or splitters connected and active inserting a second E-Que card to the left of the first card (seen from the front) will cause a temporary loss of audio to beltpacks using the original E-Que card (usually for about 10 seconds). The beltpacks do not go offline and signalisation is not lost.

5 INSTALLATION

RECONNECTING THE CPU CARD'S BACKUP BATTERY

MPORTANT: Before you install the Omega you must reconnect the CPU backup battery.

The CPU card has a lithium backup battery that powers the CPU memory if the AC electricity fails. This backup battery is shipped disconnected to preserve battery life. When you receive the matrix, you must reconnect the battery.

The matrix will operate if you do not reconnect the battery. However, if you power down the matrix you will lose all configuration information stored in the matrix's CPU card.

To reconnect the CPU memory's backup battery:

1. Please observe anti-static procedures. The CPU card can be damaged by static electricity. Please ground yourself and tools before touching cards.
2. Locate CON9 on the centermost upper portion of the CPU card.
   Under the CON9 heading, there are three pins. A jumper plug is placed over pins 2 and 3. This is the OFF position.
3. Lift the jumper plug off the pins, and place it over pins 1 and 2. This is the ON position.
   The battery is now powered.

The Eclipse Omega matrix installs in a standard Electronic Industry Association 19-inch (48 cm) equipment rack.

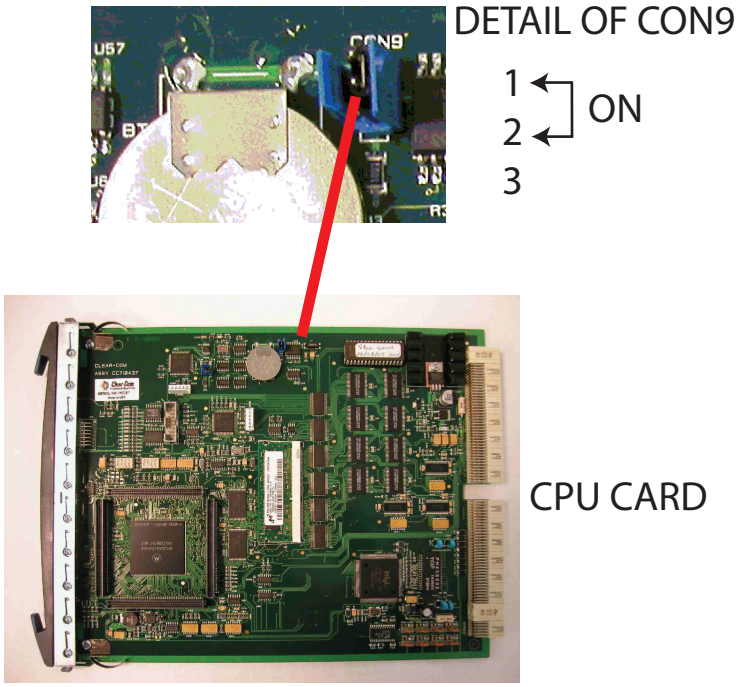


Figure 5-1: CPU card with detail of CON9 jumper plugs

Before performing any service on the CPU card, you must disconnect the card's battery. To do so, place the CON9 jumpers in the OFF position as described in the previous procedure.

PIN	STATUS
1	On
2	Common
3	Off

Table 5-1: CON9 Pin Configuration

If you are going to store the matrix for more than 3 months, or if you regularly turn off the power to the matrix, you need to temporarily deactivate the CPU backup battery while the matrix is stored. To do so, put the CON9 jumper in the OFF position as described above. When you wish to power up and start operating the matrix, reconnect the CPU backup battery by placing the CON9 jumper in the ON position, as described above.

***CAUTION:** Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type.*

Lithium batteries can overheat or explode if they are shorted. When you handle the CPU card or a loose battery, DO NOT touch any external electrical conductors to the battery's terminals or to the circuits that the terminals are connected to.

Whenever you are servicing the battery, make sure that the jumper on CON9 is connecting pin 2 (common) to either pin 1 (on) or to pin 2 (off). If the common is left floating, the CPU may behave unpredictably. For example, the microprocessor may reset itself intermittently.

VERIFYING THE SHIPMENT

When you receive your Eclipse Omega system, inspect the boxes for shipping damage. Report any shipping damage to the carrier. Your Eclipse Omega distributor is not responsible for shipping damage.

Check the packing list and verify that you received every item on the list. Save all packing materials in the event you need to return any items.

UNPACKING THE SYSTEM

When you receive your Eclipse Omega system, the circuit cards, power supplies, and rear-connector panels are pre-installed in the matrix chassis. You need to supply:

- A standard 19-inch rack in which to install the matrix.
- A personal computer to run the Eclipse Configuration System (ECS). The Eclipse Configuration System runs on Windows XP, Windows Server 2003 and Windows 2000.

- Shielded category-5 cables to connect to panels and interfaces.

INSTALLING THE ECLIPSE OMEGA MATRIX

The following overview gives you a summary of the steps required to install an Eclipse Omega matrix. More detailed information on each step is provided in the sections that follow.

To install an Eclipse Omega matrix:

1. Remove the Eclipse Omega matrix chassis from its shipping carton.
2. Leave at least 2 inches (51 mm) of clearance on all sides of the matrix chassis to ensure proper airflow. Do not block ventilation vents.
3. Check the position of circuit cards, power supplies, and rear-connector panels. Later sections in this chapter give more information on these items.
4. Apply AC power to the unit. The unit has two separate AC power entry connectors for the two separate power supplies in the system.

INSTALLING POWER SUPPLIES

The Eclipse Omega system's DC power supplies run on AC mains power. Two identical Euro Cassette power supplies are provided to ensure that every matrix will have redundant power—that is, to ensure that the matrix will continue to operate even if one supply output fails.

Each of the power supplies must be connected to a dedicated branch of AC mains power. The matrix will continue to operate even if one of the AC power branches fails.

Clear-Com ships each matrix with power supplies already installed. When you receive the matrix, connect the power supplies to AC mains power using the IEC power connectors on the matrix's rear panel.

A fully equipped Eclipse Omega matrix (13 port cards, 2 expansion cards) requires 100 to 240 VAC at 40 to 50 Hz with a maximum dissipation of 400 W.

INSTALLING THE REAR RJ-45 CONNECTOR PANELS

The matrix's rear panel is constructed of modular, individually-installable connector panels. Each port or expansion card has a corresponding rear-connector panel. Each MVX connector panel holds 16 RJ-45 connectors.

Clear-Com ships each matrix with the required number of rear-connector panels already installed. Blank rear panels fill unused card slots.

INSTALLING REAR RJ-45 CONNECTOR PANELS IN THE FIELD

Installing or removing a rear panel from the matrix is a simple procedure, allowing you to easily customize the matrix to your operating environment.

To add a rear panel to the matrix:

1. Remove the desired blank rear panel by loosening the screws and pulling the panel out. The screws are attached and cannot be removed.
2. Install the new rear panel by sliding the card into the card's guides at the top and bottom of the Eclipse Omega chassis.
3. Tighten all of the screws on the rear panel.

To remove a rear panel from the matrix:

1. Detach any devices connected to the rear panel's connectors.
2. Loosen the screws that hold the rear panel to the matrix. The screws are attached and will not fall off.
3. Remove the rear panel by pulling the panel out.

INSTALLING CPU CARDS

The CPU card's components include CMOS chips which are sensitive to static electricity. Before touching the CPU card with your hands, touch a grounded metal object, such as any unpainted surface on the matrix, to dissipate static electricity. While handling the CPU card, be careful not to bend any of the card's connector pins or component leads.

Before operating the CPU card, you must reconnect the card's battery. The CPU card is shipped with a disconnected battery to preserve battery life. For instructions on reconnecting the battery, see "RAM Back-Up Battery" on pages 3-3 and 3-4.

Store spare CPU cards in unused slots in the matrix or in electrically insulated packaging such as anti-static heavy duty plastic bags.

To insert a CPU card in the matrix:

1. Carefully place the card in the appropriate slot. Make sure the card is aligned with the top and bottom precision guides.
2. When the card has almost reached the backplane connectors, open the two ejectors, allowing them to clear the edges of the matrix. Gently insert the card further until it touches the backplane connector guides.
3. Gently close both ejector tabs at the same time, which will propel the card into the backplane connectors.

To remove a CPU card from the matrix:

1. Two card ejector tabs, located at the top and bottom of the CPU card, hold the card in place in the matrix. To remove a card, open the two ejector tabs at the same time until the card unseats from its backplane connectors.
2. Pull the card out of the matrix.

HOT PATCHING

The CPU cards are "hot patchable" and "self initializing." When the matrix is fitted with two CPU cards, a faulty CPU card can be removed and replaced while the system is powered because the second CPU card will automatically begin operating when the first card is removed. Sometimes, re-inserting a CPU can reset the matrix. It is advisable to replace CPUs in maintenance down times.

VERIFYING THE CPU CARD INSTALLATION

You can check the CPU card's operating status by looking at the lights on the front of the card. The following lights indicate that the card has been properly installed in the matrix:

- The two power-supply lights, labeled "+5V" and "+3.3V," illuminate green steadily to indicate that the power supplies are present.
- The dot-matrix array of lights displays a number to indicate which of the four stored configurations in the card's memory is currently operating.
- The "OK" light flashes to indicate that the CPU card software is running.
- The "master" light illuminates steadily on the currently active CPU card, indicating that the CPU card is properly installed and operating correctly.

INSTALLING PORT AND EXPANSION CARDS

Before installing a port or expansion card, the card's associated rear-connector panel should be installed.

To install a port or expansion card:

1. Carefully place the card in the appropriate slot. Make sure the card is aligned with the top and bottom precision guides.
2. Push the card toward the backplane connectors.
3. When the card has almost reached the backplane connectors, open the two ejector tabs, allowing them to clear the edges of the matrix. Gently insert the card further until it touches the backplane connector guides.
4. Gently close both ejector tabs at the same time, which will propel the card into the backplane connectors.

To remove a CPU card from the matrix:

1. The two card ejector tabs, located at the top and bottom of the CPU card, hold the card in place in the matrix. To remove a card, open the two ejector tabs at the same time until the card unseats from its backplane connectors.
2. Pull the card out of the matrix.

STATIC SENSITIVITY

A circuit card's components include CMOS chips that are sensitive to static electricity. Before touching a card with your hands, touch a grounded metal object, such as any unpainted surface on the matrix, to dissipate static electricity.When handling a card, be careful not to bend any of the card's connector pins or component leads.

Store spare cards in electrically insulated packaging such as anti-static heavy duty plastic bags or in unused port card slots in the matrix.

HOT PATCHING

Port and expansion circuit cards are "hot patchable" and "self initializing," meaning that a faulty card can be removed and replaced while the system is

powered, having no effect on any part of the system operation, except to the card's assigned sixteen ports.

Communication to a card's connected devices will be interrupted when that card is removed from the matrix. When the card is replaced, communication is restored.

SLOT NUMBERING

Each port and expansion card has circuitry to support 16 ports. A grid printed on the matrix's rear panel gives the numbering scheme for the ports.

CONFIGURATION

When a port card is physically installed, its ports must be assigned functions from the Eclipse Configuration System (ECS). Refer to the *Eclipse Configuration System Instruction Manual* for more information.

VERIFYING PORT CARD INSTALLATION

You can check the operating status of the matrix by viewing the front-panel status lights. The following lights indicate that a port card has been properly installed in the matrix:

- When lit, the four power-supply lights indicate that the associated power supplies are operating properly. The four lights are +12V, -12V, +5V, and +3.3V.
- The column of 16 yellow lights labeled "active" corresponds to the card's 16 ports. When lit, an "active" light indicates that there is a device connected to that port and that communication is running properly between the card and the device.
- The column of 16 green lights labeled "VOX" corresponds to the card's 16 ports. When lit, a "VOX" light indicates the audio level on that port's connected audio device has exceeded a threshold. You set the threshold audio level for that port's connected audio device in the ECS configuration software.
- The green "frame data" light illuminates green when information has successfully passed between the CPU card and the port card.
- The red "status" light illuminates when the port card fails to communicate with the CPU card.

WIRING AUDIO DEVICES TO THE MATRIX

The instruction manual *Installing the Eclipse Matrix System: An Overview* gives complete details about wiring audio devices to the matrix. The *Overview* manual also discusses RJ-45 cables and other types of cable required for system installation.

The Eclipse Omega system features two IEC mains AC power connectors that provide separate power inputs for redundant power supply combinations. If you

connect each AC input to a different mains AC branch, one power supply will continue to operate if the other supply's mains AC branch opens.

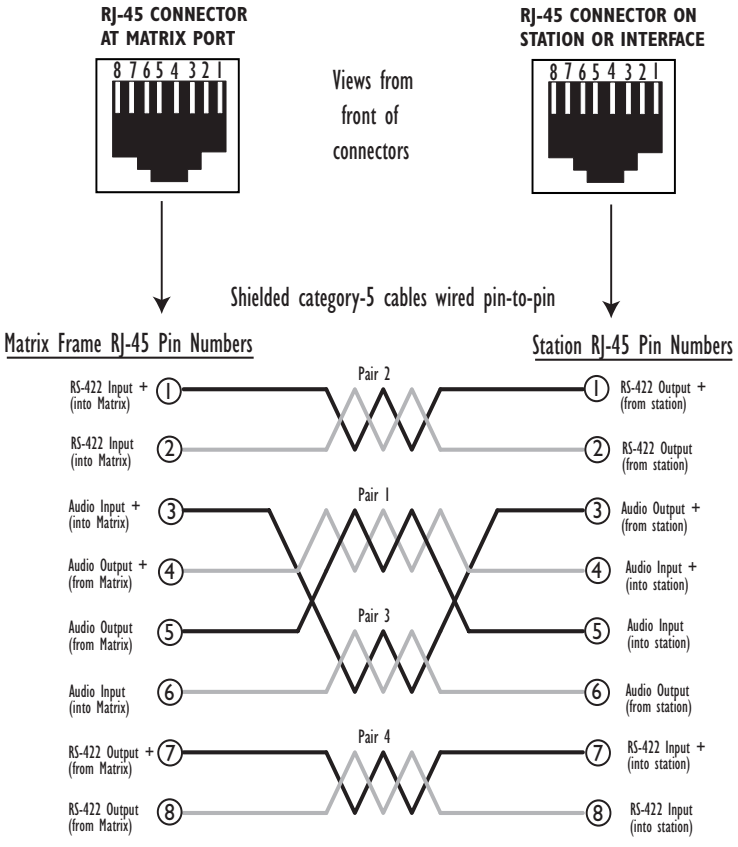
WIRING PANELS TO THE MATRIX

Eclipse uses a 4-pair (analog) or single-pair (digital) wiring scheme between the matrix and panels. All Eclipse panels have built-in RJ-45 connectors.

4-Pair Analog

Four-pair analog wiring is done with shielded CAT5 RJ-45 cable.

- Pair 1 transmits analog audio from the matrix to the panel.
- Pair 2 transmits digital data from the panel back to the matrix.
- Pair 3 transmits audio from the panel to the matrix.
- Pair 4 transmits digital data from the matrix back to the panel.


RJ-45 CONNECTOR AT MATRIX PORT
8 7 6 5 4 3 2 1
Views from front of connectors
RJ-45 CONNECTOR ON STATION OR INTERFACE
8 7 6 5 4 3 2 1
Shielded category-5 cables wired pin-to-pin
Matrix Frame RJ-45 Pin Numbers
Station RJ-45 Pin Numbers
Pair 2
RS-422 Input + (into Matrix) 1
RS-422 Input (into Matrix) 2
1 RS-422 Output + (from station)
2 RS-422 Output (from station)
Pair 1
Audio Input + (into Matrix) 3
Audio Output + (from Matrix) 4
3 Audio Output + (from station)
4 Audio Input + (into station)
Pair 3
Audio Output (from Matrix) 5
Audio Input (into Matrix) 6
5 Audio Input (into station)
6 Audio Output (from station)
Pair 4
RS-422 Output + (from Matrix) 7
RS-422 Output (from Matrix) 8
7 RS-422 Input + (into station)
8 RS-422 Input (into station)

Pair 1 Audio output from Matrix to station
Pair 2 RS-422 data input from station to Matrix
Pair 3 Audio input from station to Matrix
Pair 4 RS-422 data output from Matrix to station

Figure 5-2: Wiring from the Matrix to an Analog Panel Using RJ-45

Single-Pair Digital

Single-pair digital wiring is accomplished with double-shielded 24 AWG conductor CAT-6E enhanced STP cable. Pair 1 transmits and receives multiplexed digital and analog between the matrix and the panel.

Note: Ensure that the "select" switch on the rear of the panel is in the correct position for the intended use.

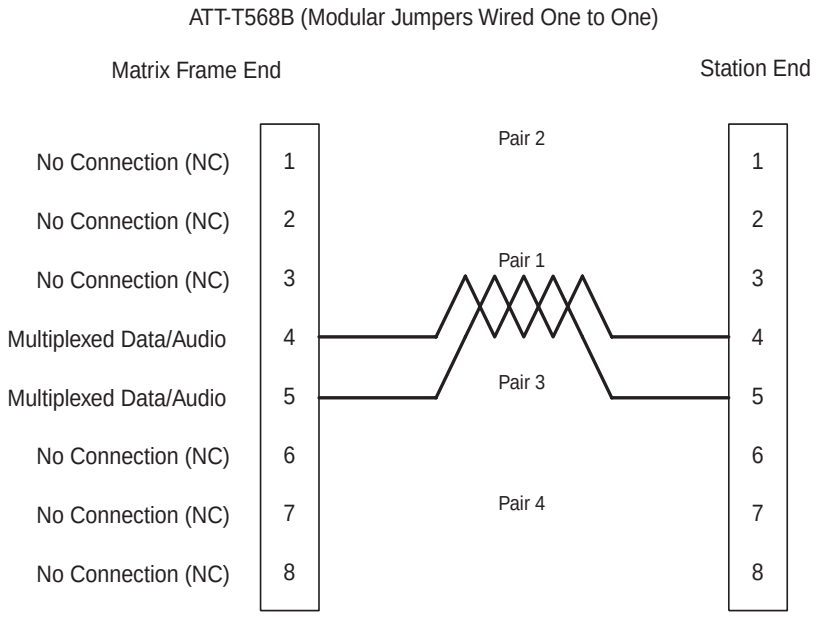


Figure 5-3: Wiring from the Matrix to a Digital Panel Using RJ-45

Note: This wiring diagram refers to the Digi-2 unit only.

WIRING CPU CARD INTERFACES

The central processor unit (CPU) card holds the circuitry for connecting to, and communicating with, the following interfaces:

- An external personal computer
- Alarm inputs and outputs
- Eight general purpose inputs (GPIs)
- Eight general purpose outputs (GPOs or relays)
- Two separate local area network (LAN) connections for Ethernet-based communication with a network
- An external GPI/RLY interface

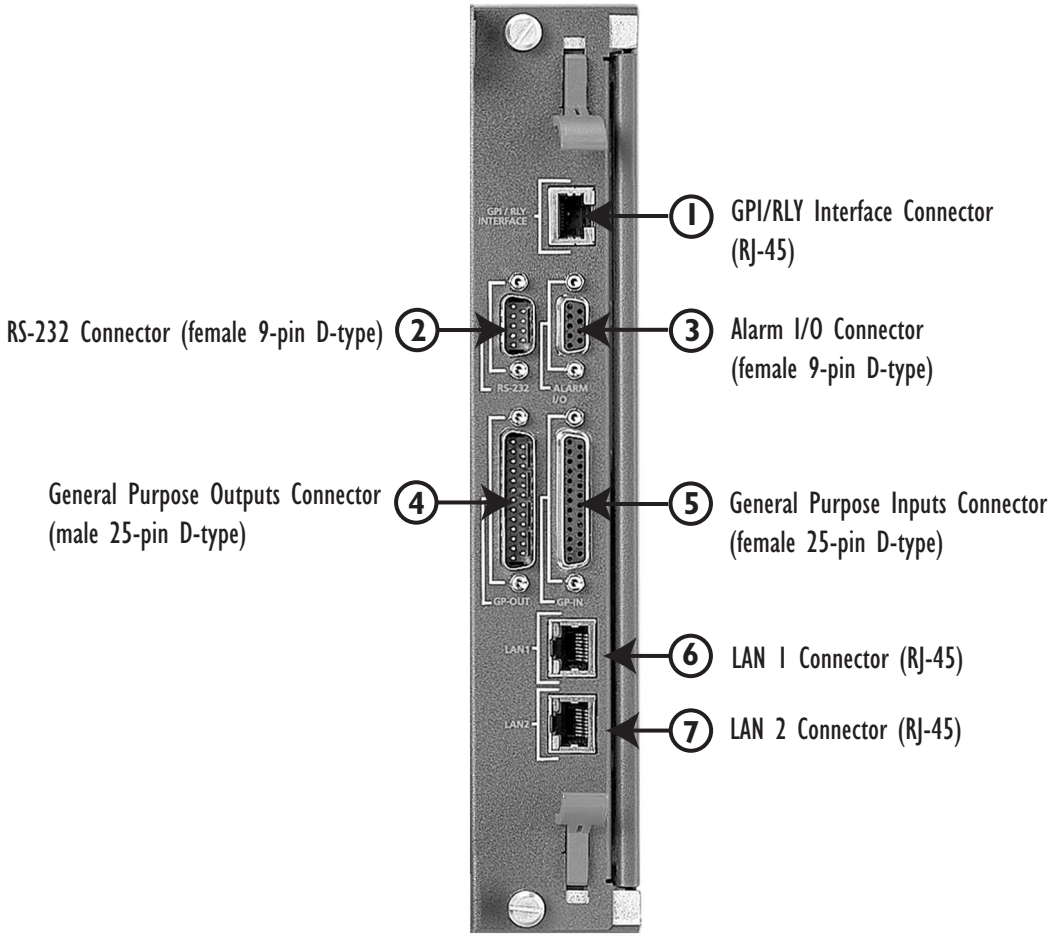


Figure 5-4: CPU Card Interface Connectors

① GPI/RLY INTERFACE CONNECTOR

For wiring pinout information for GPI/RLY interfaces, see the *Relay Interface Module (RLY-6) Instruction Manual* and the *General Purpose Inputs (GPI-6) Instruction Manual* in the set of manuals that came with your Eclipse system.

② RS-232 DB-9 CONNECTOR

The DB-9 connector labeled "RS-232" connects the Eclipse matrix to an external computer.

To connect a computer to the matrix, run cable from the matrix's "RS-232" connector to the PC's serial port. The maximum recommended length of the cable is approximately 10 feet (3 meters).

A computer has either a 9-pin serial port or a 25-pin serial port. Figure 5-5 shows the wiring for a 9-pin port. Figure 5-6 shows the wiring for a 25-pin port.

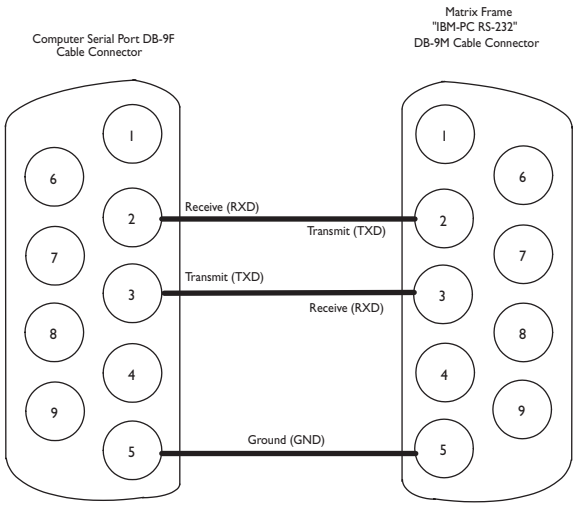


Figure 5-5: Wiring the Matrix DB-9M to a DB-9F Computer Serial Port Connector

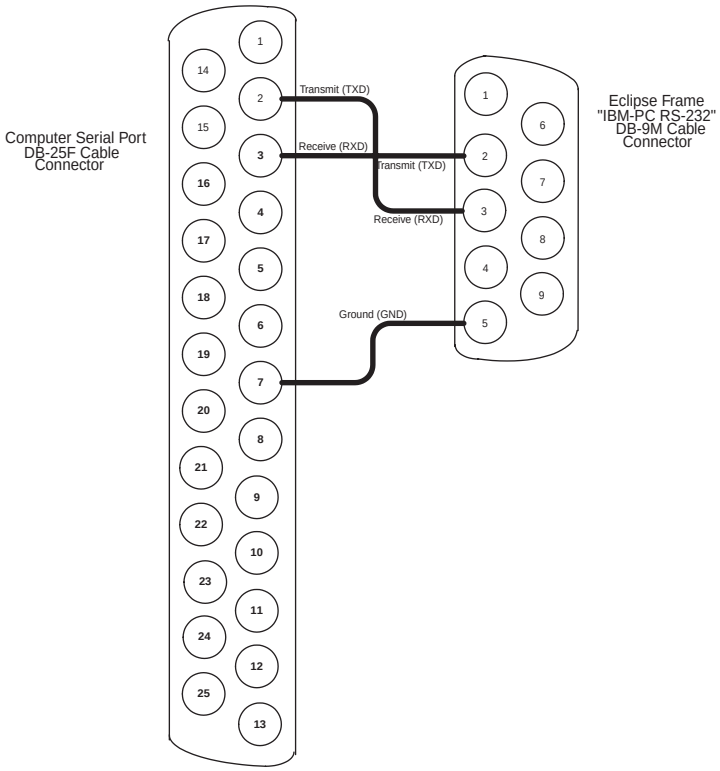


Figure 5-6: Wiring the Matrix DB-9M to a DB-25F Computer Serial Port Connector

③ ALARM I/O CONNECTOR

The DB-9F connector labeled “Alarm I/O” connects the matrix to a control circuit for an external alarm, such as a light or bell. The external alarm activates whenever an alarm condition is detected in the matrix.

***NOTE**: If your computer does not have a serial port, and only offers USB, adapters are generally available from computer parts suppliers.*

The following conditions trigger an alarm:

1. If any of the voltages produced by the first power supply unit fall below their normal levels.
2. If any of the voltages produced by the second power supply unit fall below their normal levels.
3. If an external alarm circuit or other logic circuit connected to the power supply is activated.
4. If either of the two power-supply unit fans stop operating.
5. If software on a master CPU card generates an alarm.

An alarm condition activates the relay contacts connected to pins 4, 5, and 9. These contacts are "dry," (no voltage is supplied to them by the matrix) and are rated at 1 A at 24 VDC. They should not be used for AC mains line current.

Pins are provided for adding an additional alarm source to the matrix's alarm system. Pin 6 is an alarm input to the Eclipse Omega matrix. It is connected to the input of a 3.3 V logic device. A logic high on this input will cause the Eclipse Omega matrix to detect an alarm condition. A logic low or an open circuit will cause the Eclipse Omega matrix to detect no alarm condition.

Pin 1 is a voltage source out of the Eclipse Omega matrix. It is connected through a 10Kohm pull-up resistor to the +5 V supply rail inside the Eclipse Omega matrix.

A contact closure placed across pins 1 and 6 will also cause an alarm condition. The alarm outputs of the PSU-101 power supply could be wired directly to these pins allowing the CPU card to report PSU failures also.

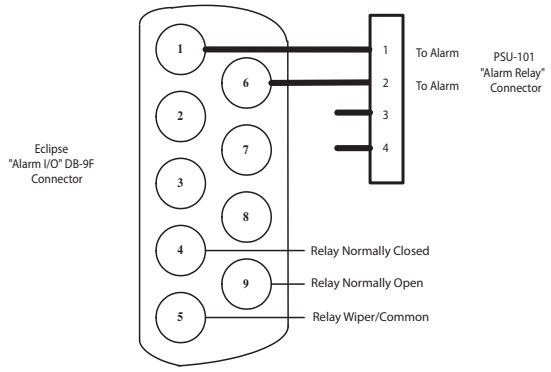


Figure 5-7: Wiring the Alarm I/O Connector to an Alarm Relay Connector

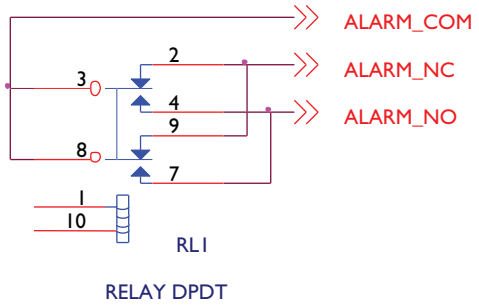


Figure 5-8: Eclipse Omega Matrix's Double-Pole Double-Throw Alarm Relay

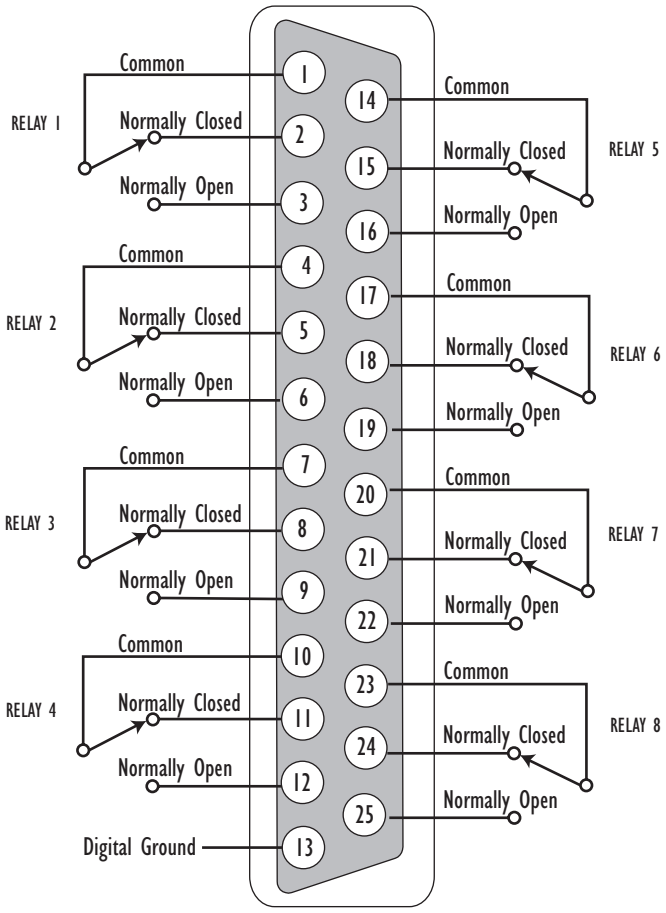
④ GENERAL-PURPOSE OUTPUTS CONNECTOR (GP OUT)

The DB-25 connector labeled "GP OUT" connects the matrix to eight double-pole double-throw (DPDT) relays with contact ratings of 30 VDC at 1A.

Each general-purpose output has a relay inside the Eclipse Omega matrix. When a general-purpose output is inactive, the associated "common" pin on the GP OUT connector will be shorted to the relevant "normally closed" pin. When a general-purpose output becomes active, the short between the "common" pin is broken and a new connection is made between the "common" pin and the "normally open" pin.

DB-25 Male Connector

PIN	DESCRIPTION
1	RELAY 1 Common
2	RELAY 1 Normally Closed
3	RELAY 1 Normally Open
4	RELAY 2 Common
5	RELAY 2 Normally Closed
6	RELAY 2 Normally Open
7	RELAY 3 Common
8	RELAY 3 Normally Closed
9	RELAY 3 Normally Open
10	RELAY 4 Common
11	RELAY 4 Normally Closed
12	RELAY 4 Normally Open
13	GROUND
14	RELAY 5 Common
15	RELAY 5 Normally Closed
16	RELAY 5 Normally Open
17	RELAY 6 Common
18	RELAY 6 Normally Closed
19	RELAY 6 Normally Open
20	RELAY 7 Common
21	RELAY 7 Normally Open
22	RELAY 7 Normally Closed
23	RELAY 8 Common
24	RELAY 8 Normally Closed
25	RELAY 8 Normally Open



30 VDC at 1 Ampere

Figure 5-9: Pin Configuration of the General-Purpose Outputs Connector

⑤ GENERAL-PURPOSE INPUTS CONNECTOR (GP IN)

The DB-25 connector labeled "GP IN" connects the matrix to eight local general-purpose inputs (GPIs).

The general-purpose inputs operate in one of two modes: the "opto-isolated" mode or the unisolated mode. The opto-isolated mode requires the externally connected equipment to provide the current to power the general-purpose input. The non-isolated mode does not require that the externally connected equipment powers the general-purpose input. The current is supplied by a voltage output on the GP IN connector.

To select a mode, move the J1 jumper on the CPU rear card to one of two positions. (The J1 jumper is located on the inner-matrix side of the DB-25 connector.)

- For opto-isolated mode, fit the J1 jumper across pins 1 and 2.
- For non-isolated mode, fit the J1 jumper across pins 2 and 3.

Note: It is recommended that you set the connector to the fully opto-isolated mode.

Opto-Isolated Mode

Figure 5-10 shows the opto-isolated connection.

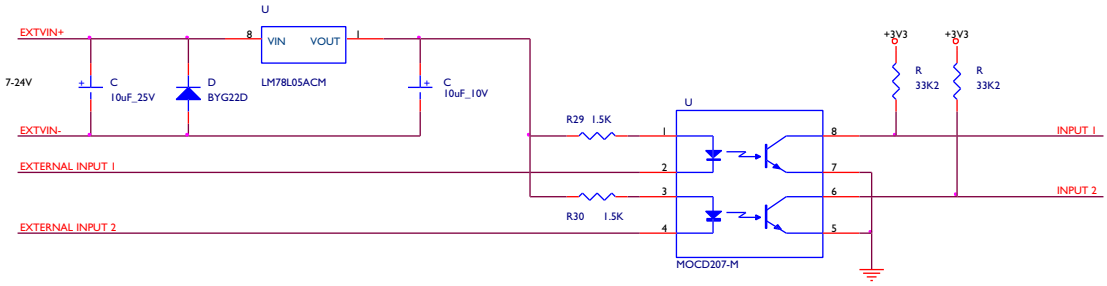


Figure 5-10: Opto-Isolated Connection to Eclipse Omega GPI Connector

In this mode, a DC voltage of between 7 and 24 volts is required at the EXTVIN+ pin with relation to the EXTVIN– pin. To cause an input to detect an active signal, you must send current from the relevant input pin.

The external device should draw no current to cause an inactive input and at least 5 mA to cause an active input. The opto-isolator drive line contains a 1.5 kOhm resistor to limit the current through the opto-isolator. You can therefore connect the input pins directly to the EXTVIN– level to cause an active input.

The voltage level at the external input pin should not be allowed to go below EXTVIN– or above +6 V with respect to EXTVIN–.

Non-Isolated Mode

Figure 5-11 shows the non-isolated connection.

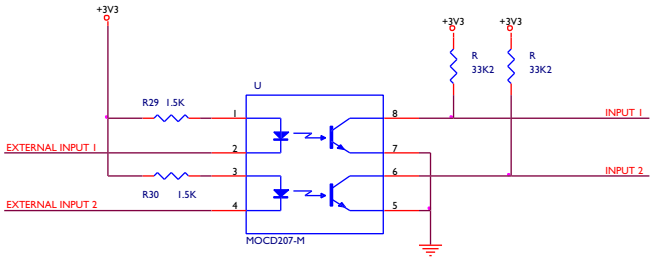


Figure 5-11: Non-Isolated Connection to Eclipse Omega GPI Connector

To cause an input to detect an active signal, you must send current from the relevant input pin.

The external device should draw no current to cause an inactive input and at least 5 mA to cause an active input. The opto-isolator drive line contains a 1.5 kOhm resistor to limit the current through the opto-isolator. You can therefore connect the input pins directly to a ground pin to cause an active input.

The voltage level at the external input pin should not be allowed to go below ground or above +6 V with respect to ground.

Pin Assignments for General-Purpose Inputs Connector

DB-25 Female Connector

PIN	DESCRIPTION
1	Logic Input 1
2	Logic Input 3
3	Logic Input 5
4	Logic Input 7
5	N/A
6	N/A
7	N/A
8	N/A
9	Ground
10	Ground
11	Ground
12	Ground
13	Ground
14	Logic Input 2
15	Logic Input 4
16	Logic Input 6
17	Logic Input 8
18	N/A
19	N/A
20	N/A
21	N/A
22	Voltage In+
23	Voltage In+
24	Voltage In–
25	Voltage In–

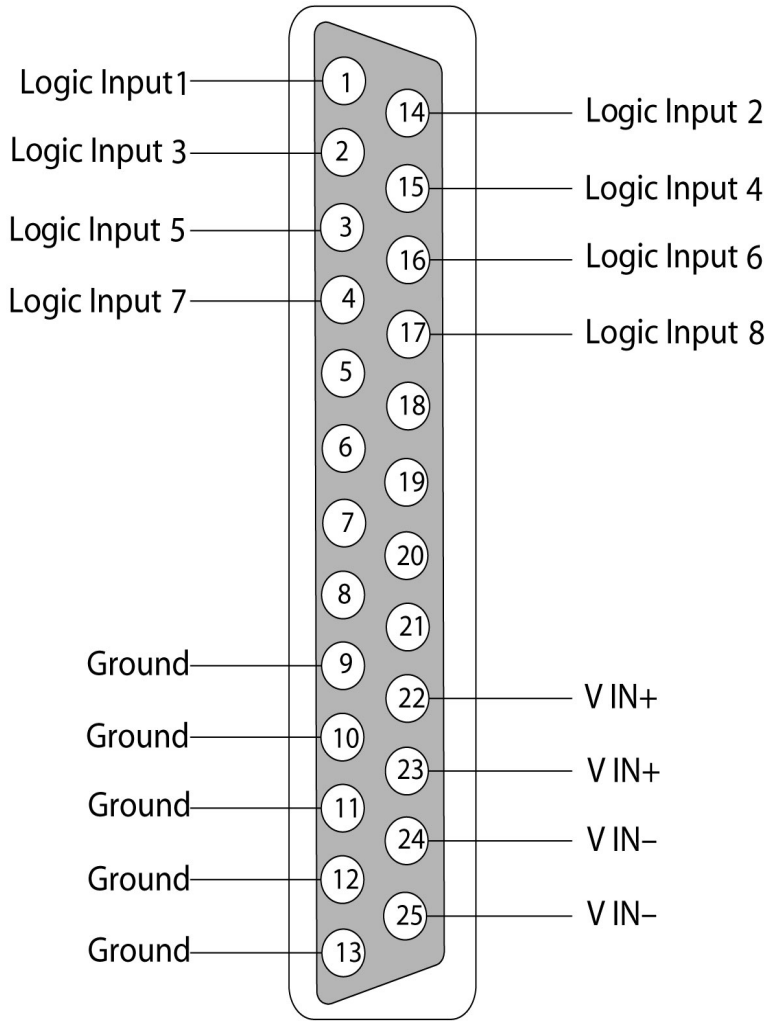
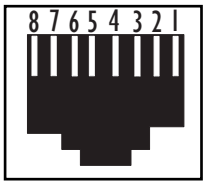


Figure 5-12: Pin Assignments for Eclipse Omega General-Purpose Inputs Connector

LOCAL AREA NETWORK CONNECTORS (LAN1 AND LAN2)

The “LAN1” and “LAN2” connectors have standard Ethernet pin assignments.

LAN1 and LAN2
Ethernet RJ-45 Connectors



PIN	FUNCTION
1	Transmit data +
2	Transmit data –
3	Receive data +
4	Unused
5	Unused
6	Receive data –
7	Unused
8	Unused

Figure 5-13: Pin Assignments for LAN1 and LAN2 Connectors

6 MAINTENANCE

INTRODUCTION

The Eclipse Omega matrix system connects a complex network of microprocessor controlled devices. Due to the complexity of the system, you should limit field service to isolating a problem to the specific circuit board that may be causing the problem. Once the circuit board has been identified, it can be either repaired or replaced.

ROUTINE MAINTENANCE RECOMMENDATIONS

MAINTAINING THE MATRIX

Because the matrix has moving air in it, the entire matrix should be cleaned at least once a year. To clean the matrix, shut off AC power, remove all cards, and use compressed air to remove any dust buildup in the matrix itself. Clean all cards with a brush to remove dust buildup.

Due to the complexity of the system, field service generally should be limited to isolating the specific component with the problem.

WARNING: *Care should be taken not to induce a static discharge in the cards. Use of a grounding wrist strap is recommended. If a grounding wrist strap is not available, touch an unpainted metal surface on the matrix chassis periodically to neutralize static electricity.*

RECOMMENDED SPARE PARTS

To facilitate quick repair of the system with minimum downtime, Clear-Com recommends keeping the following spare system components in good working condition at all times:

- One CPU card
- One port card
- One Euro Cassette power supply module
- One of each type of intercom panel in the system
- One of each type of interface in the system

FAIL-SAFE MODES

High reliability is one of the main objectives of the Eclipse Omega system design. The following features of the system minimize the effects of a component failure.

DUAL, INDEPENDENT POWER SUPPLIES

The Eclipse Omega matrix includes two Euro Cassette power supply units. One power supply unit can power an entire matrix; the second unit provides a backup in case of an equipment failure.

In addition, the two supplies have separate IEC connectors to AC mains power, and are designed for completely automatic and transparent changeover between supplies in the event of a power failure on one of the AC branches.

***CAUTION**: To reduce the risk of electric shock, plug each of the power cords to separate branch circuits with different service ground.*

POWER SUPPLY ALARM OUTPUT

The power supplies contain an over-temperature sensor that is connected to both an audible alarm and a warning light, giving you the necessary forewarning to diagnose and correct any power anomalies while the system remains operational.

If any individual power supply fails, an alarm can be issued to a remote location to alert operators that part of a power supply has failed. The failure of a single supply will issue an alarm, but the Eclipse Omega system will continue to operate normally, powered by the second supply.

"HOT PATCHABILITY"

All CPU cards, port cards, and all Euro Cassette power supplies are "hot patchable"– that is, they can be plugged in or removed from the matrix while the power is on, and they will be neither damaged, nor will they cause damage to the system. In addition, the system smoothly incorporates a newly added card. Sometimes re-inserting a CPU card can reset the matrix. Replace CPU cards during maintenance down times if possible.

ONBOARD PROCESSORS

If one port card malfunctions, the malfunction will normally affect only the panels connected to that port card. The malfunction should not affect any other cards or panels in the system. In all cases, removing a faulty card affects only the devices connected to that card.

FAIL-SAFE COMMUNICATION

In the event of a CPU card failure, the second CPU card takes over operation of the system, while the first card is repaired or replaced.

TROUBLESHOOTING

When attempting to identify the cause of the trouble, it is helpful to begin with the two most basic areas which cause malfunctions:

- The flow of electric current from the power supplies to the cards.

• The flow of data between the program software, the circuit cards, and the attached audio devices.

The following sections discuss troubleshooting these two basic categories of problems.

TROUBLESHOOTING POWER-SUPPLY PROBLEMS

General Principles

Electric current in the matrix starts at the power supplies, travels through the matrix's backplane connectors, and then travels to the circuit cards themselves. When power-supply problems occur, those three areas—the power supplies, the backplane connectors, and the circuit cards—should be explored to identify where the trouble is occurring. Solving power-supply problems starts with identifying the specific component causing the problem.

Note: The matrix's backplane connectors are part of the matrix's infrastructure and are not serviceable by field personnel. If you determine that a problem is in the matrix's backplane connectors, you must send the matrix in for repair. Backplane connector malfunctions are rare, but should be considered as possiblities.Clear-Com will ship a spare matrix to use while the damaged matrix is being repaired.

If you need to send any equipment back to Clear-Com, follow the procedure described in the Warranty chapter of this manual for obtaining a return authorization number from the Clear-Com Service Department.

A lit power-supply light on a component indicates that the matrix's electric current has traveled successfully to that component and is powering the component. For example, if the power-supply lights on the CPU card are lit, the electric current has successfully traveled from the matrix's power supplies to the CPU card.

If a power-supply light is not lit on a component, the electric current has not reached that component for some reason. Knowing where the current has stalled helps to identify the component that needs repair.

For example, if all of the power-supply lights on all cards do not light, the electricity supply may have given out either in the power supplies themselves or in the matrix's backplane connectors. A faulty connector on the backplane, or a crack in the backplane can cause all of the matrix's power-supply lights to go out because the path on which the electric current is traveling has been blocked.

This is a rare problem, but one to consider as a possibility. Repairing the problem in this case would involve determining whether the problem is in the power supplies or the backplane connectors.

When you identify a problem in the power supplies, the backplane connectors, or the circuit cards, you can then swap out the suspect component with a properly functioning component to see if the problem is repaired.

Specific Troubleshooting Examples

Troubleshooting more specific problems becomes easier when keeping these general principles in mind. The following examples describe specific problems and suggested solutions.

Problem: All of the power supply lights do not illuminate on one port card.

Before repairing or replacing card, try to determine where the problem is occurring. You can try one or both of the following options:

OPTION 1 Take the bad card out of the matrix, and insert it into a known good slot in the matrix.

- If the power supply lights still do not illuminate, the problem is probably in the card itself. Repair or replace the card.
- If the power supply lights illuminate, the problem may be in the matrix's backplane connectors, which carry electric current from the power supplies to the cards. You can send the matrix to Clear-Com for investigation or repair. In the meantime, you can substitute another matrix for the damaged one. Clear-Com will send you a matrix to use while the damaged one is being repaired.

OPTION 2 Take a known good card, and insert it into the bad slot.

- If the power supply lights illuminate, the problem is probably in the card. Repair or replace the card.
- If the power-supply lights do not illuminate, the problem may be in the matrix's backplane connectors, which carry electric current from the power supplies to the cards. You can send the matrix to Clear-Com for investigation or repair. In the meantime, you can substitute another matrix for the damaged one. Clear-Com will send you a matrix to use while the damaged one is being repaired.

Once you have isolated the problem to the card or the backplane, it is easier to take the next step which is to repair or replace the suspect component.

Problem: The power supply lights do not illuminate on all cards in the matrix.

In this situation, the most probable problem is that the matrix's power supplies are not sending out any electric current, since none of the cards are receiving power. Although less likely, the problem may be in the matrix's backplane connectors.

The following procedure helps you isolate where the trouble is occurring:

Check the power supplies' alarm lights. If the power alarm lights are indicating a problem with the power supply, swap it out with a new power supply.

- If this repairs the problem, the problem was in the power supply.
- If the problem persists even after the power supply has been replaced, the problem is in the matrix's backplane connectors. Send the matrix back to Clear-Com for repair or replacement. In the meantime another matrix can

be substituted for the damaged one. Clear-Com will send you a matrix to use while the damaged one is being repaired.

Problem: The power supply lights do not illuminate on one of the two CPU cards.

When the system is functioning properly, the power-supply lights on both CPU cards illuminate. If the power-supply lights on a CPU card fail to illuminate, the problem may be with the card itself, or with the backplane connectors that carry the electric current from the power supplies to the cards. (The backplane connectors are part of the infrastructure of the matrix and are not serviceable by field personnel.)

The following procedure helps you to isolate where the trouble is occurring:

1. Swap the CPU cards. Put the first card in the second CPU slot and the second card in the first CPU slot. The problem will follow the card or the slot.
   - If the power supply lights do not illuminate on the bad card (the card with the lights out) when it is inserted in the other CPU slot, the problem is probably in the card.
   - If the power-supply lights on the bad card illuminate when the card is inserted in the other CPU slot, the problem is probably not in the card itself. The problem may be with the backplane connectors or power supplies.
2. Check the power supplies' alarm lights. If the alarm lights are indicating a problem with the power supply, swap it out with a new power supply.
   - If this repairs the problem, the problem was in the power supply.
   - If the problem persists even after the power supply has been replaced, the problem is in the backplane. Send the matrix back to Clear-Com for repair or replacement. In the meantime, you can substitute another matrix for the damaged one. Clear-Com will send you a substitute matrix to use while the damaged one is being repaired.

Problem: The power supply lights are out on both CPU cards.

The problem may be with power supplies, since both cards appear not to be receiving power. Although less likely, the problem may be in the matrix's backplane connectors.

The following procedure helps you isolate where the trouble is occurring:

Check the power supplies' alarm lights. If the alarm lights are indicating a problem with the power supply, swap it out with a new power supply.

- If this repairs the problem, the problem was in the power supply.
- If the problem persists even after the power supply has been replaced, the problem is in the backplane. Send the matrix back to Clear-Com for repair or replacement. In the meantime another matrix can be substituted for the damaged one. Clear-Com will send you a substitute matrix to use while the damaged one is being repaired.

TROUBLESHOOTING DATA PROBLEMS

General Principles

The other type of problem that can occur in the system is when data is not flowing properly between the program software, the circuit cards, and the attached panels and interfaces. A troubleshooting sequence in this situation would be to first check cabling, then reset the card or panel, then reset the entire system.

Port Card Reset Button

Resetting the port card causes the configuration information for the card and its attached devices to reload to the card from the CPU card's operational memory (located in its microprocessor's RAM), thus clearing up any corruption of data that may have occurred in the port card's microprocessor. The card and all connected panels and interfaces momentarily stop their current activity and restart. The reset button must be pressed for more than two seconds to take effect.

If the entire system is operating except for one port card, or one or more panels connected to the card, press the reset button for that card only.

Note: This button is slightly recessed from the front panel to prevent it from being accidentally pressed. You need a tool, such as a bent paper clip, to press this button.

CPU Card Reset Button

When you reset the CPU card by pressing its reset button, the card's non-volatile RAM reloads all configuration information to the card's microprocessor. Resetting the card clears any corruption of data in the card's microprocessor. The card momentarily stops its current activity and restarts.The same system configuration that was active before you reset the card will be active after you reset it.

Note: The reset button is slightly recessed from the front panel to prevent it from being accidentally pressed. You need a tool, such as a bent paper clip, to press this button.

CPU Card Full Reset Button

When you press and hold the full-reset button and simultaneously press the reset button, the system performs a cold restart. All cards in the matrix reset regardless of any system preferences in the program software. All audio devices connected to the cards, such as panels and interfaces, reset as well.

When the cards and connected audio devices reset, they momentarily stop their current activity and restart. During this process configuration information is downloaded to the port cards and connected audio devices from the CPU card's microprocessor.

The same system configuration that was active before you reset the card will be active after you reset it. You must press the button for more than two seconds for the reset to take effect.

Note: Under normal operating conditions it is not necessary to perform a full reset. Technical personnel might perform a full restart if they believe that the CPU card is operating incorrectly as a result of corruption of the microproccessor's internal data or instruction sequence.

Specific Troubleshooting Examples

The following examples describe specific problems and suggested solutions.

Problem: A port light on a port card does not illuminate, although there is a panel attached to that port.

1. Check the panel and the wiring leading to it.
2. Check the Frame Data light. If there is no indication of matrix communication to this card while the other cards in the matrix are communicating, reset the card.
3. Replace the card.
4. Replace the panel.

Problem: Audio sounds low or distorted from a panel.

1. Check the matrix's currently active CPU card's power lights. If any of the lights are not lit, replace the card.
2. Check the port card's input and output gain settings in the program software.
3. Check the panel's listen-level adjustment settings in the program software.

SYSTEM BLOCK DIAGRAM

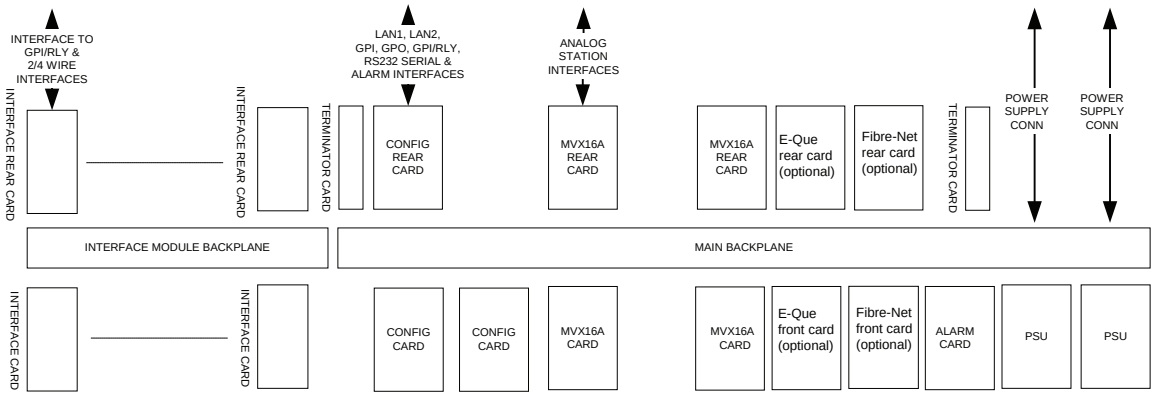


Figure 6-1: System Block Diagram

7 SPECIFICATIONS

OMEGA MATRIX TECHNICAL SPECIFICATIONS

0 dBu is referenced to 0.775 volts RMS

Matrix Capabilities

Ports per Port Card	16
Maximum Port Cards	15
Maximum CPU Cards	2 (included)
Maximum Fibre Expansion Cards	2
Maximum E-Que Expansion Cards	4
Maximum Power Supply Units	2 (included)
Maximum RJ-45 Ports per Matrix	240

Mechanical

Height	10.6 inches (267 mm or 6 RU)
Width	19 inches (482 mm)
Depth	16 inches (410 mm)
Front Card Depth	300 mm
Weight	20 to 35 kg
Power Consumption	300 W Maximum
Temperature	0 to +50° C, ambient; -55° to +70° C, storage
Humidity, Maximum	90% non-condensing

Matrix Performance

Sample Rate	48 kHz
Resolution	24 bit
Frequency Response @ 48 kHz sampling	30 Hz – 22 kHz ± 3 dBu
Crosstalk (adjacent channel)	<–70 dBu
Nominal Level	0 dBu
Matrix headroom	+18 dBu
Distortion	<0.05 %, @ 0 dBu, 300 Hz to 10 kHz; <0.1 %, @ 0 dBu, 100 Hz to 20 kHz
Off Noise	<–100 dBu relative to +20 dBu, 20 Hz - 22kHz
On Noise	<–85 dB relative to +20 dBu, 20 Hz - 22 kHz
Key Response, Intra-System	<40 ms for audio route
Linked Systems	<60 ms for audio between matrices

Fiber Interface Front Card

Height	6RU
Depth	300 mm
Temperature	0 to +40° C, operating; -55° to +70° C storage
Humidity	40 - 90% non-condensing
Power	+3.3V

Fiber Interface Rear Card

Height	6RU
Depth	58mm (max)
Temperature	0 to +40° C, operating; -55° to +70° C storage
Humidity	40 - 90% non-condensing
Power	+3.3V

E-Que Interface Front Card

Height	6RU
Depth	300 mm
Temperature	0 to +40° C, operating; -55° to +70° C storage
Humidity	40 - 90% non-condensing
Power (combined cards)	+3.3V 3.5A +5V 0.7A +12V 0.05A

E-Que Interface Rear Card

Height	6RU
Depth	58mm (max)
Temperature	0 to +40° C, operating; -55° to +70° C storage
Humidity	40 - 90% non-condensing

Analog Port Card

Height	6 RU
Depth	300 mm
Audio Interface	16, bi-directional
Input Format	Balanced
Output Format	Balanced
Ground Isolation	None; expected at User Panel/Station
Port Card Outputs	
Level	0 dBu nominal
Impedance	100 Ohms balanced
Frequency Response	30 Hz–22 kHz ± 3 dB
Distortion	<0.05 %, @ 0 dBu, 300 Hz to 10 kHz; <0.1 %, @ 0 dBu, 100 Hz to 20 kHz
Port Card Inputs	
Level	0 dBv nominal
Impedance	600 Ohms balanced
Frequency Response	30 Hz–22 kHz ± 3 dB
Distortion	<0.05 %, @ 0 dBu, 300 Hz to 10 kHz; <0.1 %, @ 0 dBu, 100 Hz to 20 kHz

Data Interface: 16 bi-directional

Input Format	RS-422 @ 2400 to 19200 kb/s
Output Format	RS-422 @ 2400 to 19200 kb/s
Input Termination	100 ohm ± 10%
Output Termination	None; expected at User Station
Isolation	None; expected at User Station

Backplane Connector: FCI/BERG Metral

Port Connector	RJ-45 to Clear-Com standard pinout
Transmission Distance	3000 ft. (1000 m) maximum

System Programming

Group Calls	100
Number of Grouped Ports	4000 maximum
Conferences per Matrix	64
IFB per Matrix	100
Priority Levels	5
Isolates	Any crosspoint
Listen Level Control	0.71 dB steps
Input Level Control	0.355 dB steps
Output Level Control	0.355 dB steps
VOX Input Detection Threshold	0 dB to – 32 dB adjustable

Minimum PC Requirements

Processor	Pentium III 600 MHz (minimum recommended)
Memory	512 MB RAM minimum
Hard Disk	500 MB free space
Input Devices	3.5-inch Floppy Disk Drive, CD-ROM Drive
Display Resolution	SVGA
User Entry	Keyboard, Mouse
Ports	2 serial ports
Network	IEEE 802.3 Ethernet Card
Operating Systems	Windows XP Professional SP2 / Server 2003 SP1 / 2000 SP4

Note: For details of software requirements please refer to the ECS User Manual part no. 810299.

Power Supply Unit

Format	Euro Cassette
Quantity	2 per matrix
Mounting	Front
Backplane Connectors	Positronics
AC Power Input	IEC (1 per PSU)
Input Voltage	AC 100 V to 240 V, 50/60 Hz
Power Consumption	400 W maximum
Status Indicators	LEDs viewable from front of rack

Notice About Specifications

While Clear-Com makes every attempt to maintain the accuracy of the information contained in its product manuals, that information is subject to change without notice. Performance specifications included in this manual are design-center specifications and are included for customer guidance and to facilitate system installation. Actual operating performance may vary.

8 GLOSSARY

Bus A bus is the channel or path between the components in the matrix along which electrical signals flow to carry information from one component to the next. In the Eclipse matrix the bus is located in the etched surface of the midplane.

Call Signal A call signal is an electronic signal sent from one station or interface to another. A call signal can be audible and/or visual. Typically a call signal is sent to get the attention of a station operator who may have turned down their intercom speaker's volume or removed their headset. It can also be sent to activate an electronic relay.

Category-5 cable EIA/TIA 568 category specification relating to network cabling. Shielded category-5 cabling is required for Eclipse matrix wiring.

Central Matrix The term "central matrix" is used to differentiate the central hardware and software of the intercom system from the connected audio devices. The central matrix consists of: (1) the metal housing for the circuit cards and power supplies, (2) the circuit cards, (3) the power supplies, (3) the rear panel connectors which connect the matrix's hardware to stations and interfaces.

Destination A device—such as an intercom station, beltpack, or interface—to which you send audio signals. The device from which you send audio signals is called a "source."

Duplex All real-time communication between individuals talking face to face is full duplex, meaning that you can both talk and listen simultaneously. The Eclipse Omega matrix provides full-duplex audio.

Eclipse Configuration System Software program that guides the operation of the central matrix circuit cards and connected stations.

Ethernet International standard which describes how information is transmitted across a network. Provides for the efficient organization of network components.

IFB "Interruptible Foldback." The term "foldback" refers to sending "program" audio, or some other audio mix, back to the announcer while he is on the air. Doing so allows the announcer to monitor himself, other announcers, videotapes of commercials, or some mix of sources, while he is on the air. This is typically found in television news and live broadcast events.

The announcer typically wears a small ear piece so he can hear the selected foldback audio mix. When a director wants to give directions to the announcer on air, or to announce changes in the program, he must "interrupt" the foldback. To do this, he uses a channel specifically set up to interrupt the foldback audio.

Interface A piece of electronic hardware designed to convert the 4-wire signals of a central matrix port to some other form of communication, such as 2-wire

party line, telephone, etc. The interface is connected to a central matrix port. The external non-4-wire device is then connected to the interface.

ISO The ISO function, short for "station ISOlation," allows you to call a destination and interrupt all of that destination's other audio paths and establish a private conversation. When you complete your call, the destination's audio pathways are restored to their original state before the interruption.

Label A label is an alphanumeric name of up to five characters that identifies a source, destination, or control function accessed by your intercom station. Labels appear in the displays of the intercom station. Labels can identify stations, ports interfaced to other external equipment, fixed groups, party lines, and special control functions.

Non-volatile memory Data stored in the CPU's firmware (ROM) that is not lost when the power is turned off.

Panel Also referred to as "station." Any intelligent intercom device connected to the rear-panel ports of the central matrix. This term does not refer to devices connected through interfaces.

Port Any of the Eclipse matrix's 208 input/output RJ-45 connectors that are used to connect cable from the matrix to stations and interfaces. Each "port" connects to a separate audio channel in the matrix intercom system.

Program Any separate audio source that is fed into the intercom channels. In television applications, for example, "program" audio is the audio that is broadcast on air.

Station Also referred to as "panel." Any intelligent intercom device connected to the rear-panel ports of the central matrix. This term does not refer to devices connected through interfaces.

Rack Unit or RU Standardized unit of mounting space on a rack panel. Each rack unit is 1.75 inches (44.45 mm) of vertical mounting space. Therefore 1 RU is 1.75 inches (44.45 mm) of vertical mounting space, 2 RU is 3.5 inches (88.9 mm), 3 RU is 5.25 inches (133.35 mm), and so on.

Sidetone The sound of your own voice heard in your own earphone as you speak.

Source In this manual, the term "source" refers to a device—such as an intercom station, interface, or beltpack —that sends audio into the matrix. The device to which audio is sent is called a "destination."

VOX In the Eclipse Omega system, when audio at a station exceeds a threshold, a light switches on at the station's port card to visually cue you. The threshold level is set in the Eclipse Configuration Software.

LIMITED WARRANTY

Vitec Group Communications (VGC) warrants that at the time of purchase, the equipment supplied complies with any specification in the order confirmation when used under normal conditions, and is free from defects in workmanship and materials during the warranty period.

During the warranty period VGC, or any service company authorized by VGC, will in a commercially reasonable time remedy defects in materials, design, and workmanship free of charge by repairing, or should VGC in its discretion deem it necessary, replacing the product in accordance with this limited warranty. In no event will VGC be responsible for incidental, consequential, or special loss or damage, however caused.

WARRANTY PERIOD

Return Material Authorization (RMA) numbers are required for all returns.

Both warranty and non-warranty repairs are available.

The product may consist of several parts, each covered by a different warranty period. The warranty periods are:

- Cables, accessories, components, and consumable items have a limited warranty of 90 days.
- Headsets, handsets, microphones, and spare parts have a limited warranty of one year.
- UHF wireless IFB products have a limited warranty of one year.
- UHF wireless intercom systems have a limited warranty of three years.
- All other Clear-Com and Drake brand systems and products, including beltpacks, have a limited warranty of two years.

The warranty starts at the time of the product's original purchase. The warranty start date for contracts which include installation and commissioning will commence from the earlier of date of the Site Acceptance Test or three months from purchase.

TECHNICAL SUPPORT

To ensure complete and timely support to its customers, VGC's User Support Center is staffed by qualified technical personnel. Telephone and email technical support is offered worldwide by the User Support Center.

The User Support Center is available to VGC's customers during the full course of their warranty period.

Instructions for reaching VGC's User Support Centers are given below.

Telephone for Europe, Middle East and Africa: +49 40 6688 4040 or +44 1223 815000

Telephone for the Americas and Asia: +1 510 337 6600

Email: vitec.support@AVC.de

Once the standard warranty period has expired, the User Support Center will continue to provide telephone support if you have purchased an Extended Warranty.

For latest contact information please refer to the Service and Support section at www.clearcom.com.

WARRANTY REPAIRS AND RETURNS

Before returning equipment for repair, contact a User Support Center to obtain a Return Material Authorization (RMA). VGC representatives will give you instructions and addresses for returning your equipment. You must ship the equipment at your expense, and the support center will return the equipment at VGC's expense.

For out-of-box failures, use the following contact information:

Europe, Middle East and Africa

Tel: +44 1223 815000 Email: customerservicesEMEA@vitecgroup.com

North America, Canada, Mexico, Caribbean & US Military

Tel: +1 510 337 6600 Email: customerservicesUS@vitecgroup.com

Asia Pacific & South America

Tel: +1 510 337 6600 Email: customerservicesAPAC@vitecgroup.com

VGC has the right to inspect the equipment and/or installation or relevant packaging.

For latest contact information please refer to the Service and Support section at www.clearcom.com.

NON-WARRANTY REPAIRS AND RETURNS

For items not under warranty, you must obtain an RMA by contacting the User Support Center. VGC representatives will give you instructions and addresses for returning your equipment.

You must pay all charges to have the equipment shipped to the support center and returned to you, in addition to the costs of the repair.

EXTENDED WARRANTY

You can purchase an extended warranty at the time of purchase or at any time during the first two years of ownership of the product. The purchase of an extended warranty extends to five years the warranty of any product offered with a standard two-year warranty. The total warranty period will not extend beyond five years.

Note: VGC does not offer warranty extensions on UHF wireless intercom systems, or on any product with a 1-year or 90-day warranty.

LIABILITY

THE FOREGOING WARRANTY IS VGC'S SOLE AND EXCLUSIVE WARRANTY. THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY OTHER REQUIRED IMPLIED WARRANTY SHALL EXPIRE AT THE END OF THE WARRANTY PERIOD. THERE ARE NO OTHER WARRANTIES (INCLUDING WITHOUT LIMITATION WARRANTIES FOR CONSUMABLES AND OTHER SUPPLIES) OF ANY NATURE WHATSOEVER, WHETHER ARISING IN CONTRACT, TORT, NEGLIGENCE OF ANY DEGREE, STRICT LIABILITY OR OTHERWISE, WITH RESPECT TO THE PRODUCTS OR ANY PART THEREOF DELIVERED HEREUNDER, OR FOR ANY DAMAGES AND/OR LOSSES (INCLUDING LOSS OF USE, REVENUE, AND/OR PROFITS). SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES OR THE LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. IN ANY EVENT, TO THE MAXIMUM EXTENT PERMITTED UNDER APPLICABLE LAW, VGC'S LIABILITY TO CUSTOMER HEREUNDER SHALL NOT UNDER ANY CIRCUMSTANCES EXCEED THE COST OF REPAIRING OR REPLACING ANY PART(S) FOUND TO BE DEFECTIVE WITHIN THE WARRANTY PERIOD AS AFORESAID.

This warranty does not cover any damage to a product resulting from cause other than part defect and malfunction. The VGC warranty does not cover any defect, malfunction, or failure caused beyond the control of VGC, including unreasonable or negligent operation, abuse, accident, failure to follow instructions in the manual, defective or improperly associated equipment, attempts at modification and repair not approved by VGC, and shipping damage. Products with their serial numbers removed or defaced are not covered by this warranty.

This warranty does not include defects arising from installation (when not performed by VGC), lightning, power outages and fluctuations, air conditioning failure, improper integration with non-approved components, defects or failures of customer furnished components resulting in damage to VGC provided product.

This limited warranty is not transferable and cannot be enforced by anyone other than the original consumer purchaser.

This warranty gives you specific legal rights and you may have other rights which vary from country to country.